## California High-Speed Train Project



# Request for Proposal for Design-Build Services

RFP No.: HSR 11-16
Geotechnical Exploration Data Report
Volume 2
Clinton Ave to Herndon Canal



## THIS PAGE INTENTIONALLY LEFT BLANK

Geotechnical Exploration Data
Volume 2 of 2

June 1, 2012



San Francisco Transbay Terminal

Millbrae-SFO

Redwood City

or Palo Alto

Sacramento

San Jose

Diridon

Gilroy

**Downtown Modesto** 

**Downtown Merced** 

Fresno

Kings/Tulare Regional Station (Potential Station)

Bakersfield

Sylmar

Norwalk Anaheim Palmdale

Ontario Airport
Riverside

Murrieta

Escondido
University City
San Diego



#### CALIFORNIA HIGH-SPEED TRAIN PROJECT



#### **PROCUREMENT PACKAGE 1**

#### **GEOTECHNICAL EXPLORATION DATA**

Volume 2 of 2



For

#### **AECOM**

2020 L Street, Suite 300 Sacramento CA, 95811



2360 Qume Drive, Suite A, San Jose, CA 95131 (408) 452-9000

#### **TABLE OF CONTENTS**

#### Volume 1 of 2

1. PROJECT DESCRIPTION		1
2. PURPOSE OF THE GEOTECHNICAL EXPLORATION		2
3.0 FIELD EXPLORATION		
3.1 Exploratory Boreholes		
3.2 Cone Penetration Test (CPT)		
3.3 Downhole Geophysical Logging		
3.4 Installation of Standpipe Piezometers		4
4.0 LABORATORY TESTING		5
5.0 LIMITATIONS		5
Project Location Plan	Plate No:1	
Summary of Geotechnical Exploration and Exploration Location Plan	Plate No:2	

#### **APPENDICES**

Appendix A Field Explorations

Appendix A-1 Log of Test Boring

Appendix A-2 Cone Penetration Test Results

Appendix A-3 Downhole Geophysical Measurements Report

Appendix B Laboratory Test Data

#### Volume 2 of 2

Appendix C PARIKH Consultants, Inc. Summary of Geotechnical Data
Appendix D URS/HMM/Arup Joint Venture (URS) Geotechnical Data



## **APPENDIX C**

PARIKH CONSULTANTS, INC.
SUMMARY OF GEOTECHNICAL DATA (Field & Laboratory Data Only)

(Part of Volume 2 of 2)

#### PARIKH CONSULTANTS, INC.<sup>1</sup>

## SUMMARY OF GEOTECHNICAL DATA (Field & Laboratory Data only) CLINTON AVENUE TO HERNDON CANAL, FRESNO, CALIFORNIA CALIFORNIA HIGH-SPEED TRAIN PROJECT

A geotechnical investigation was performed by PARIKH Consultants, Inc. (PCI) for the approximately 5 miles of CHST track from Clinton Avenue to Herndon Canal in Fresno, California. The Veterans Boulevard Interchange location was excluded from this study. This interchange location is included in a separate study that is from Veterans Boulevard to Avenue 17. The field exploration program consisted of nine (9) soil borings to depths of approximately 31.5 to 121.5 feet below existing ground surface (BGS) and one (1) seismic cone penetration test (SCPT) to a depth of 75 feet BGS. A summary of geotechnical data from this investigation is presented in the subsequent sections. The purpose of this summary is to present the geotechnical data all in one place for easy reference. *Refer to the Geotechnical Data Report (GDR) dated February 22, 2012 by PCI for more details*.

Based on the Geotechnical Data Report dated February 22, 2012 by PCI, from Clinton Avenue to Herndon Canal in Fresno, the CHST will be all at-grade with several new or reconstructed roadway overcrossing/overhead structures. A CHST structure will be required at Herndon Canal crossing. The SR 99 freeway will be relocated about 100 feet west of its current alignment from Clinton to Ashlan Avenue, a distance of approximately 2 miles. The existing City of Fresno arterial street overcrossings of the UPRR and SR 99 will have to be modified for the CHST between Clinton and Ashlan Avenues.

The field exploration consisted of drilling 8 hollow stem auger and 1 rotary-wash boreholes and performing 1 Seismic Cone Penetration Test (SCPT). The geotechnical exploration program conducted for this study is detailed in the following table.

#### **Summary of Geotechnical Exploration Program**

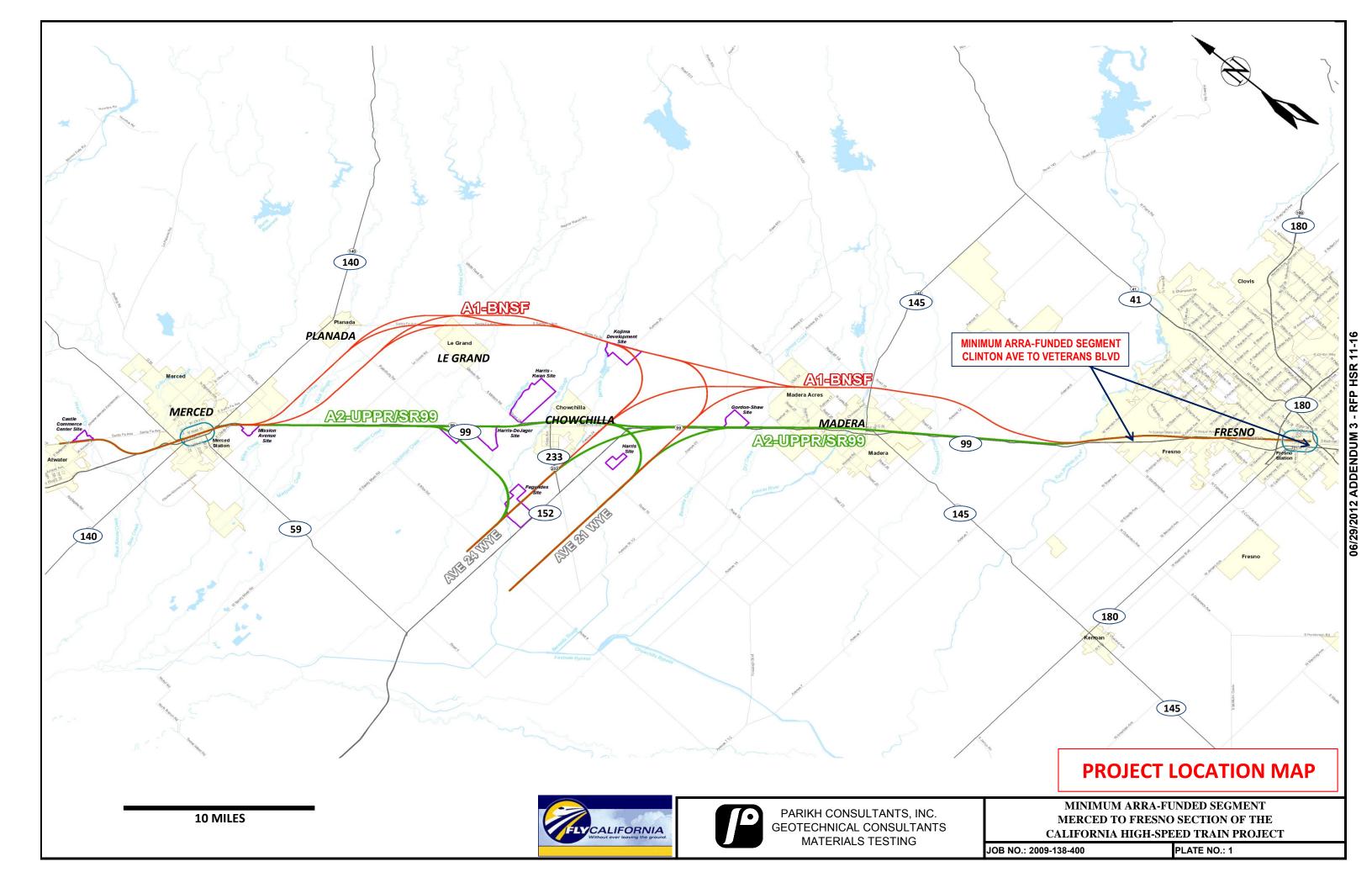
Boring ID	Project Element/Purposes	Exploration Type	Approximate Exploration Location	Exploration Depth (ft)
S0001A	Clinton Avenue Overcrossing Fresno Yard Overcrossing	Soil Boring	STA 2072+50	121.5
S0002A	CHST Track Study	Soil Boring	STA 2034+00	31.5
S0003A CHST Track Study		Soil Boring	STA 2004+00	31.5
S0004CPT	Seismic Evaluation and Verification	Seismic CPT	STA 1967+50	75
S0005A Ashlan Ave Overhead		Soil Boring	STA 1967+50	121.5
S0006A	CHST Track Study	Soil Boring	STA 1939+50	31.5
S0007A	CHST Track Study	Soil Boring	STA 1917+50	31.5
S0008A	Shaw Ave overcrossing	Soil Boring	STA 1894+50	121.5
S0009R	Herndon Canal Bridge	Soil Boring	STA 1858+50	111.5
S0010A	CHST Track Study	Soil Boring	STA 1834+00	31.5

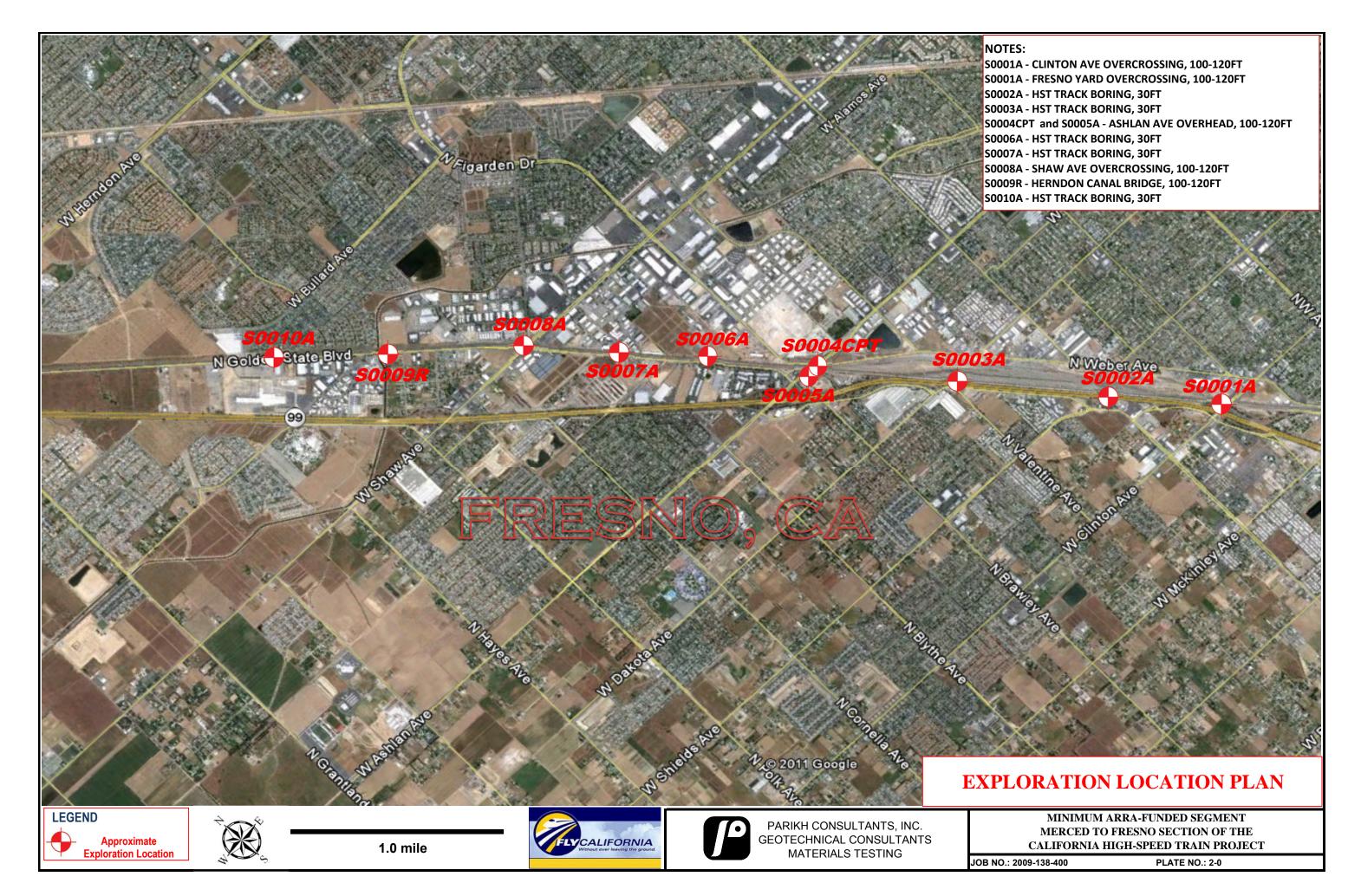
<sup>&</sup>lt;sup>1</sup> Reference document: California High-Speed Train Project, Clinton Avenue to Herndon Canal Geotechnical Data Report dated February 2012, prepared by PARIKH Consultants, Inc.

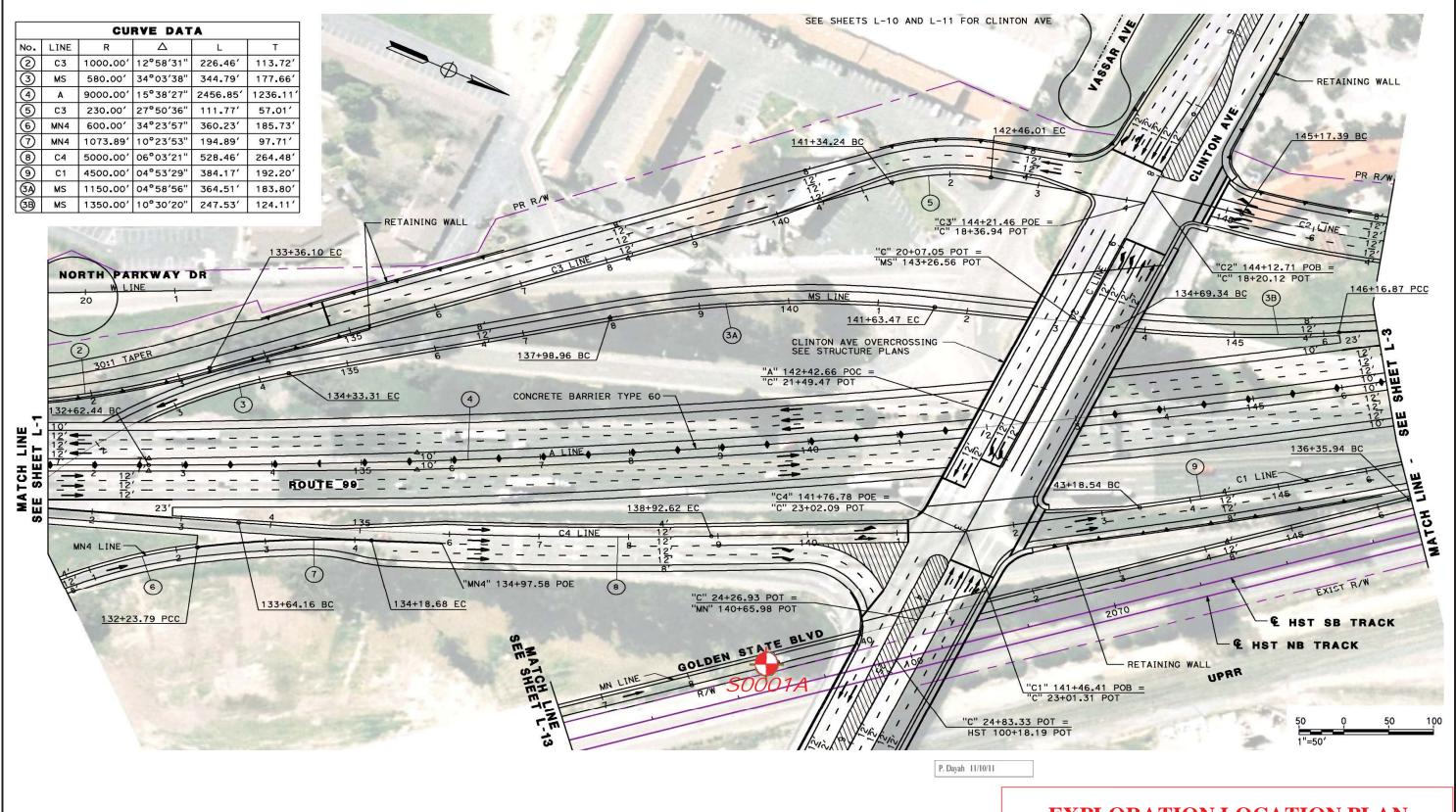
The GDR by PARIKH has been distributed to proper parties by the California High-Speed Rail Authority. The geotechnical data from the field exploration and laboratory test results are attached for easy reference. All descriptions and appendices attached are from the GDR dated February 22, 2012 by PARIKH. It should be recognized that the GDR must be read in its entirety for a comprehensive understanding of the project and findings of the investigation.

#### **ATTACHMENTS:**

- 1. PROJECT LOCATION PLAN
- 2. EXPLORATION LOCATION PLAN
- 3. LOG OF TEST BORINGS (PARIKH 2011)
- 4. CONE PENETRATION TEST (CPT) REPORT
- 5. LABORATORY TEST DATA







LEGEND

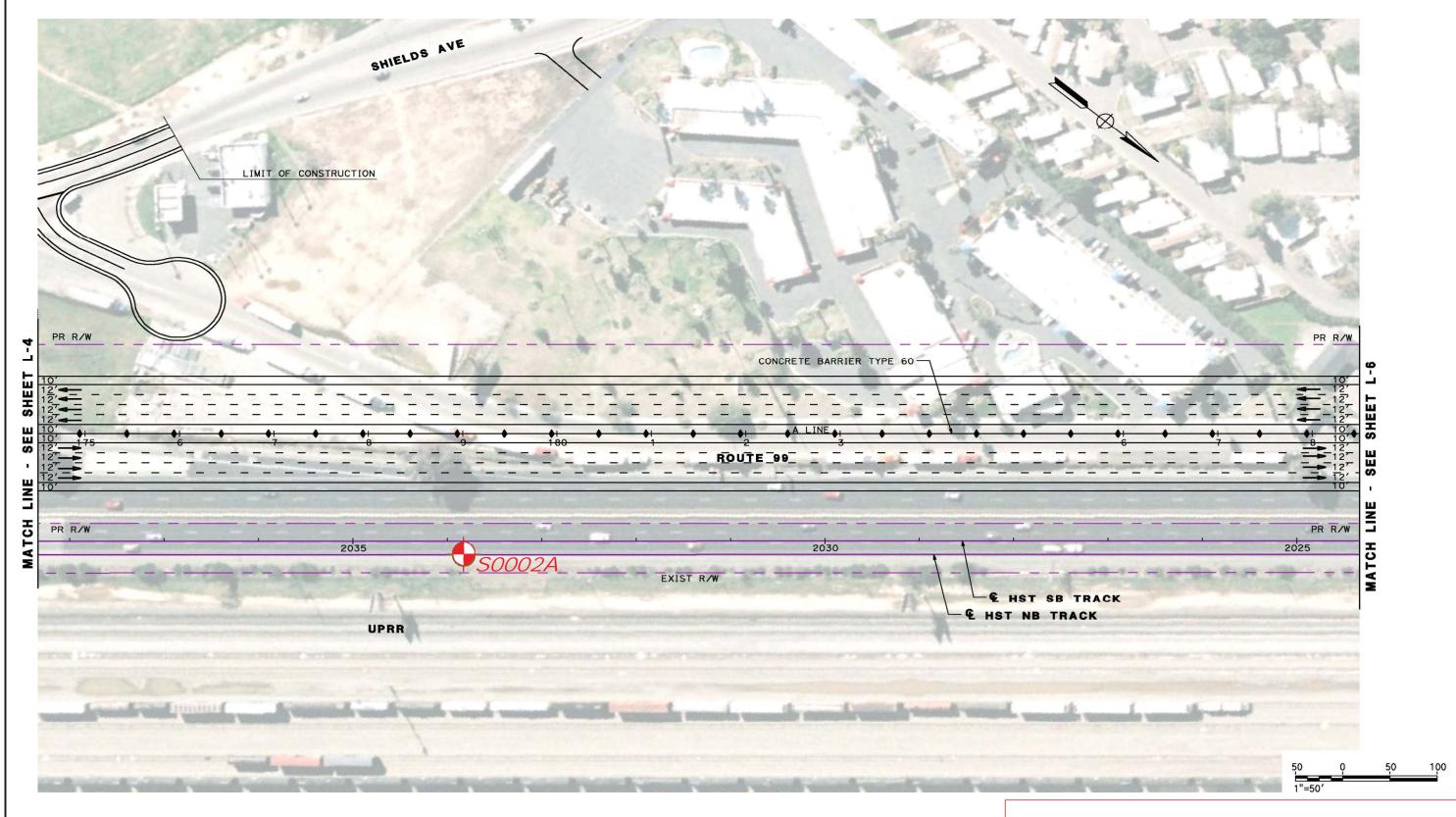
Approximate
Exploration Location

NOTES: THIS EXPLORATION LOCATION PLAN WAS MODIFIED FROM THE RECORD SET 15% DESIGN SUBMITTAL BY AECOM AND CH2MHILL DATED APRIL 29, 2011.





MINIMUM ARRA-FUNDED SEGMENT MERCED TO FRESNO SECTION OF THE CALIFORNIA HIGH SPEED TRAIN PROJECT



LEGEND

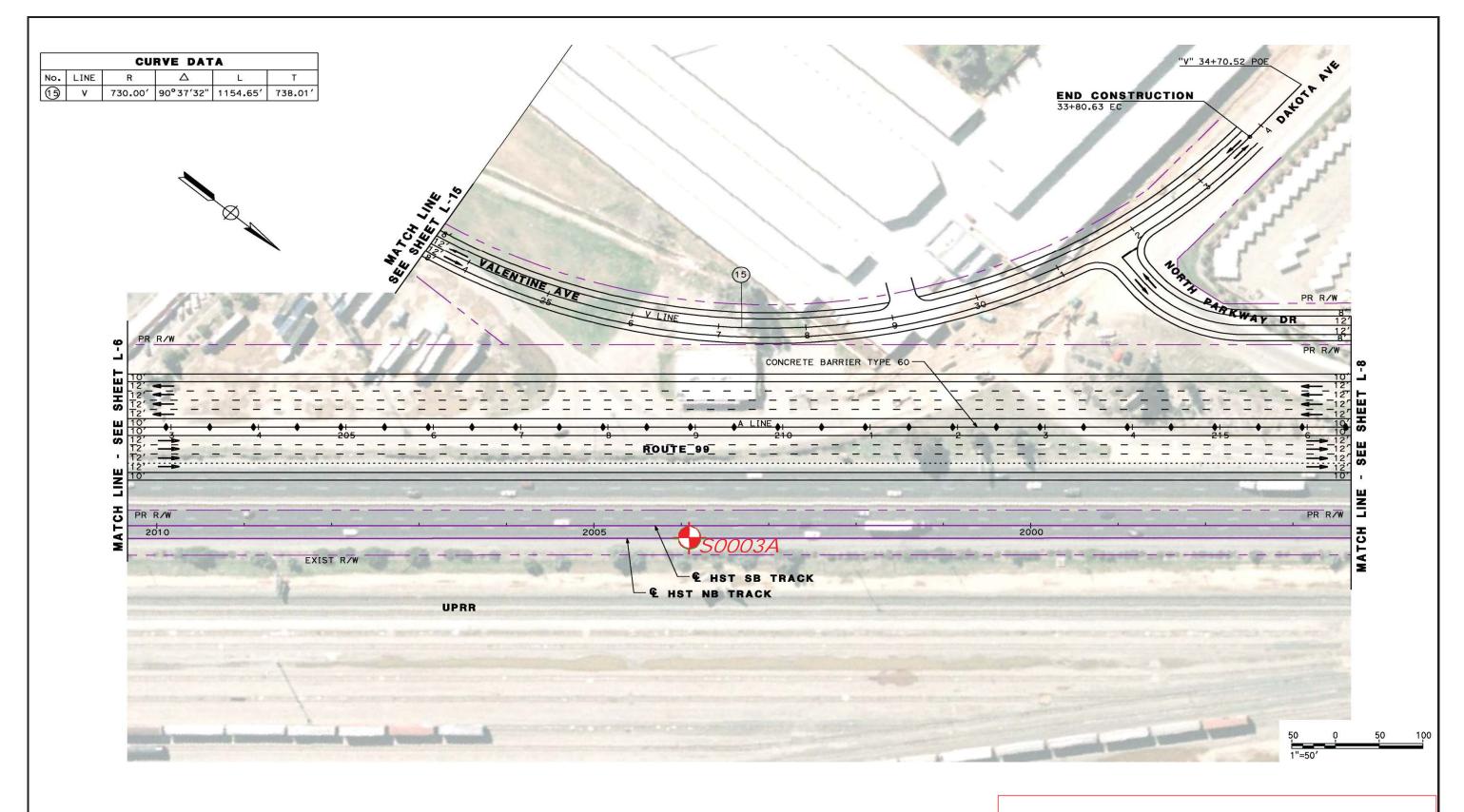
Approximate
Exploration Location

NOTES: THIS EXPLORATION LOCATION PLAN WAS MODIFIED FROM THE RECORD SET 15% DESIGN SUBMITTAL BY AECOM AND CH2MHILL DATED APRIL 29, 2011.





MINIMUM ARRA-FUNDED SEGMENT MERCED TO FRESNO SECTION OF THE CALIFORNIA HIGH SPEED TRAIN PROJECT



**LEGEND Approximate Exploration Location** 

NOTES: THIS EXPLORATION LOCATION PLAN WAS MODIFIED FROM THE RECORD SET 15% DESIGN SUBMITTAL BY AECOM AND CH2MHILL DATED APRIL 29, 2011.

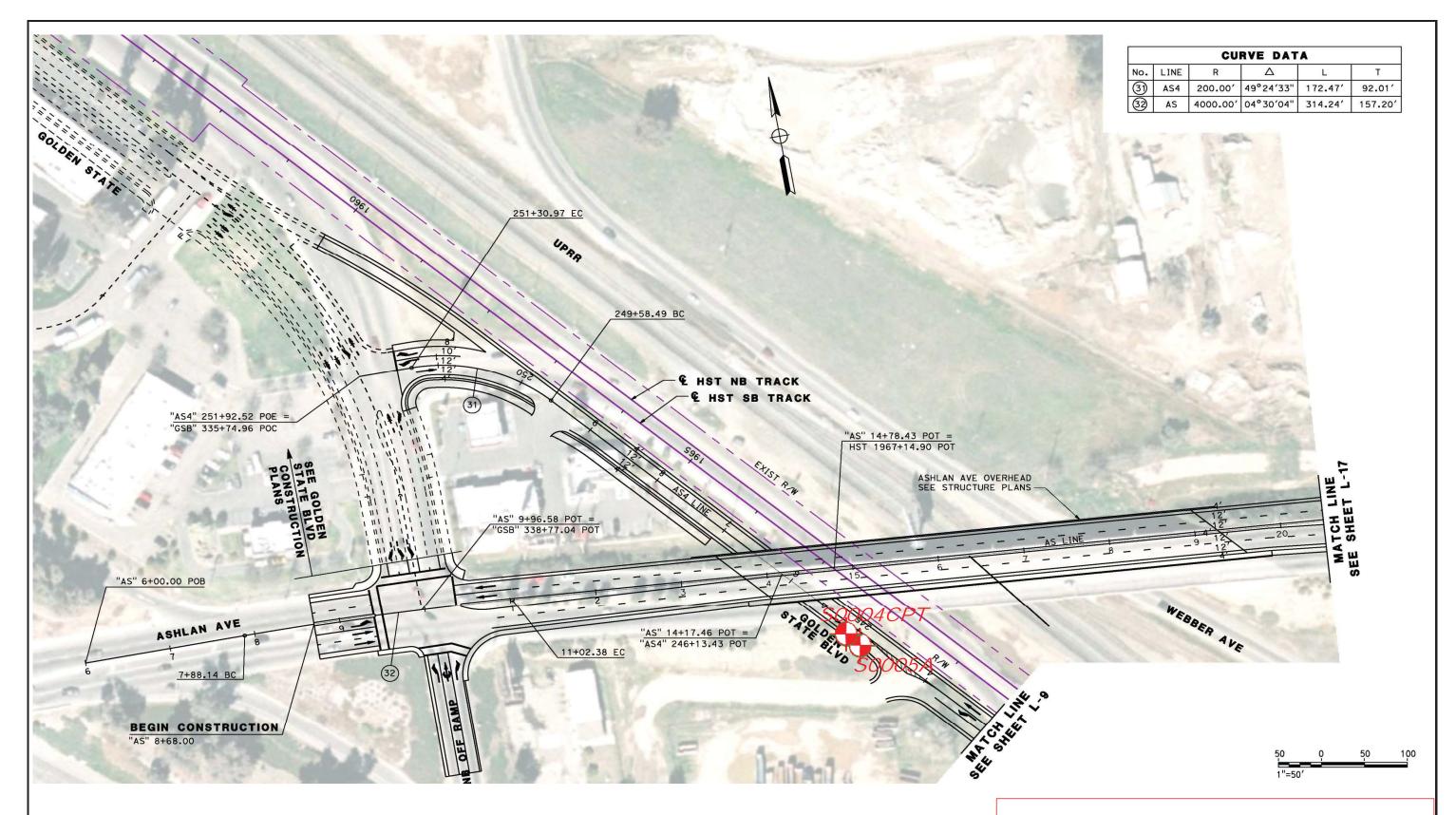




MINIMUM ARRA-FUNDED SEGMENT MERCED TO FRESNO SECTION OF THE CALIFORNIA HIGH SPEED TRAIN PROJECT

JOB NO.: 2009-138-400

PLATE NO.: 2-3



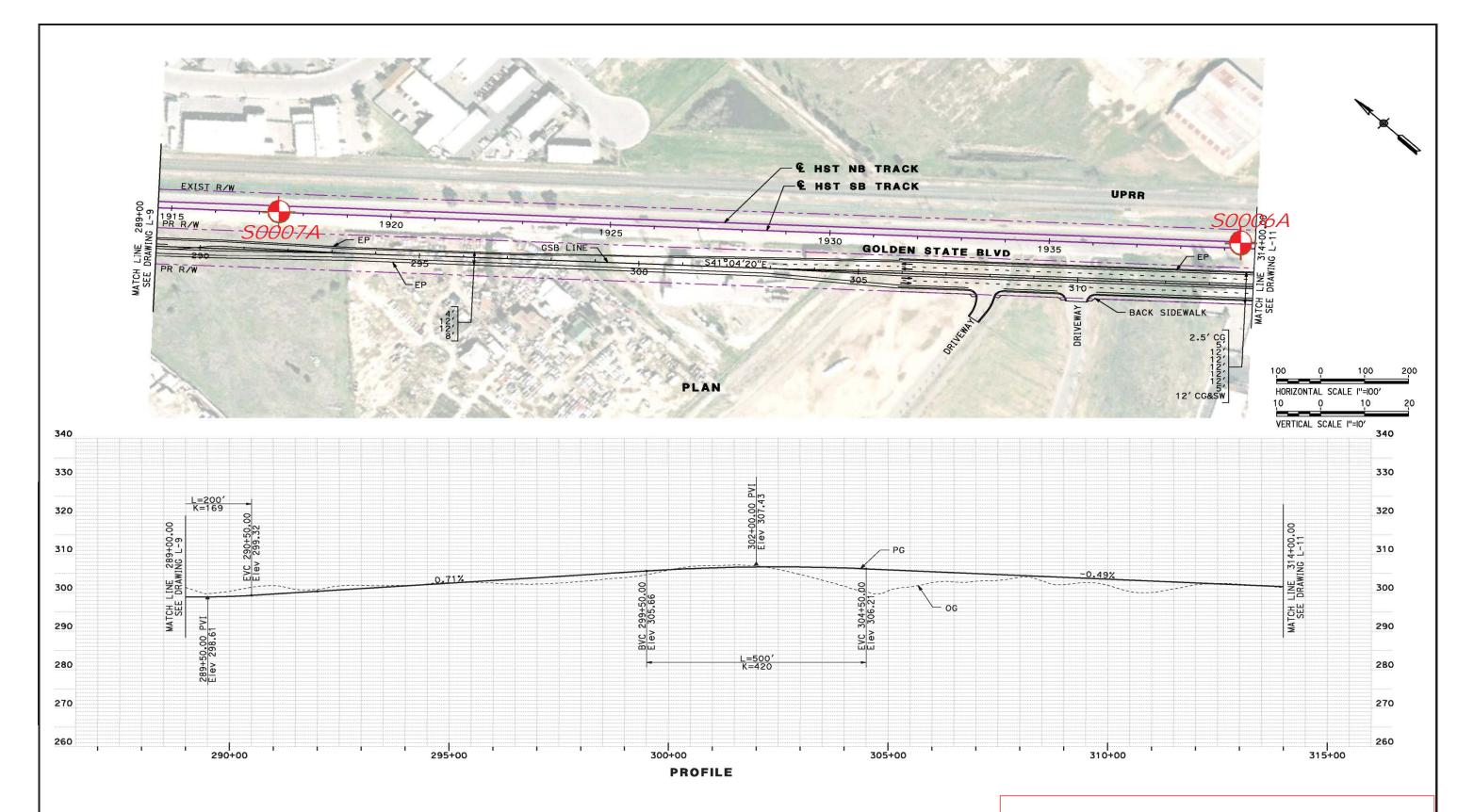


NOTES: THIS EXPLORATION LOCATION PLAN WAS MODIFIED FROM THE RECORD SET 15% DESIGN SUBMITTAL BY AECOM AND CH2MHILL DATED APRIL 29, 2011.





MINIMUM ARRA-FUNDED SEGMENT MERCED TO FRESNO SECTION OF THE CALIFORNIA HIGH SPEED TRAIN PROJECT



LEGEND

Approximate
Exploration Location

NOTES: THIS EXPLORATION LOCATION PLAN WAS MODIFIED FROM THE RECORD SET 15% DESIGN SUBMITTAL BY AECOM AND CH2MHILL DATED APRIL 29, 2011.





MINIMUM ARRA-FUNDED SEGMENT MERCED TO FRESNO SECTION OF THE CALIFORNIA HIGH SPEED TRAIN PROJECT



LEGEND

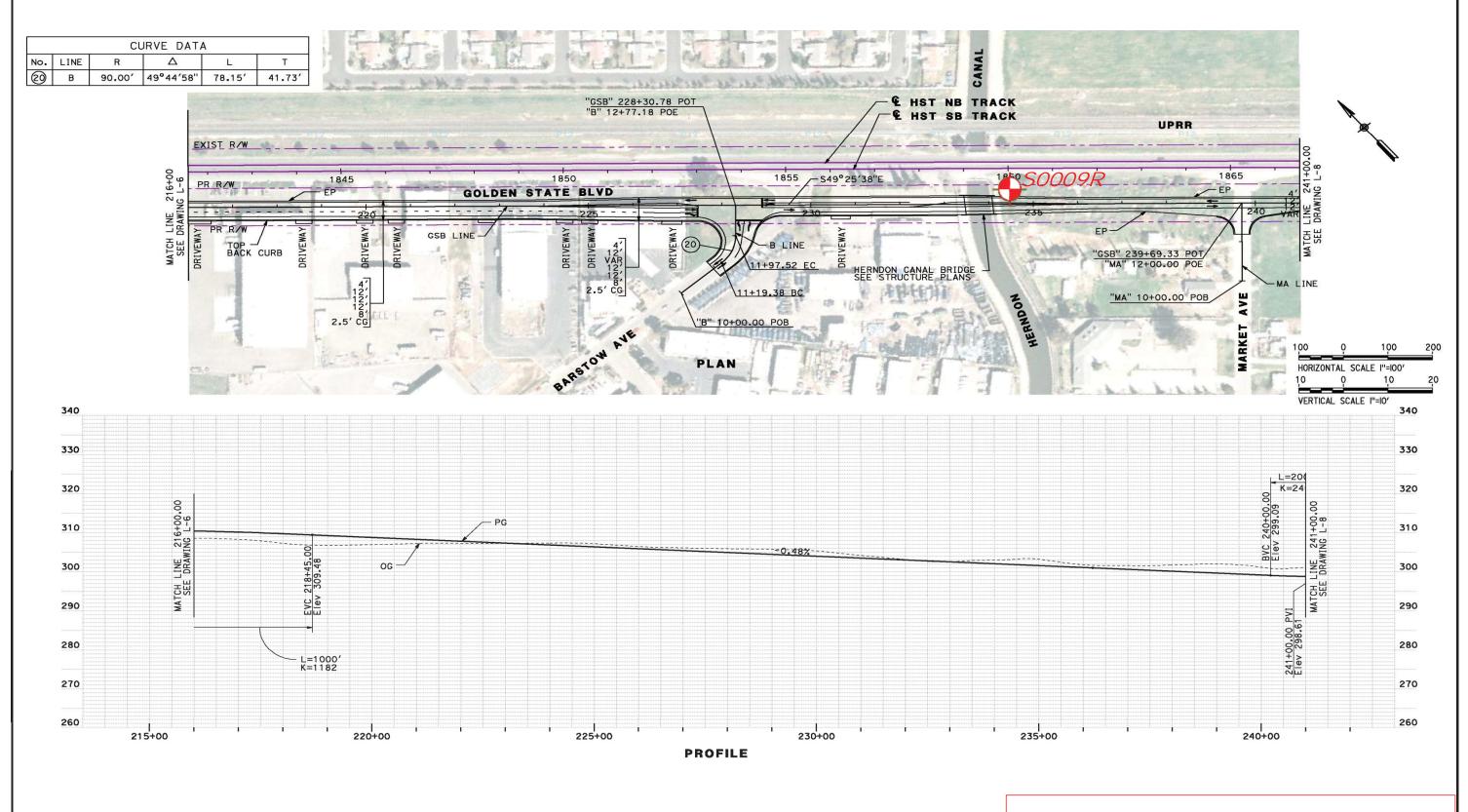
Approximate
Exploration Location

NOTES: THIS EXPLORATION LOCATION PLAN WAS MODIFIED FROM THE RECORD SET 15% DESIGN SUBMITTAL BY AECOM AND CH2MHILL DATED APRIL 29, 2011.





MINIMUM ARRA-FUNDED SEGMENT MERCED TO FRESNO SECTION OF THE CALIFORNIA HIGH SPEED TRAIN PROJECT



LEGEND

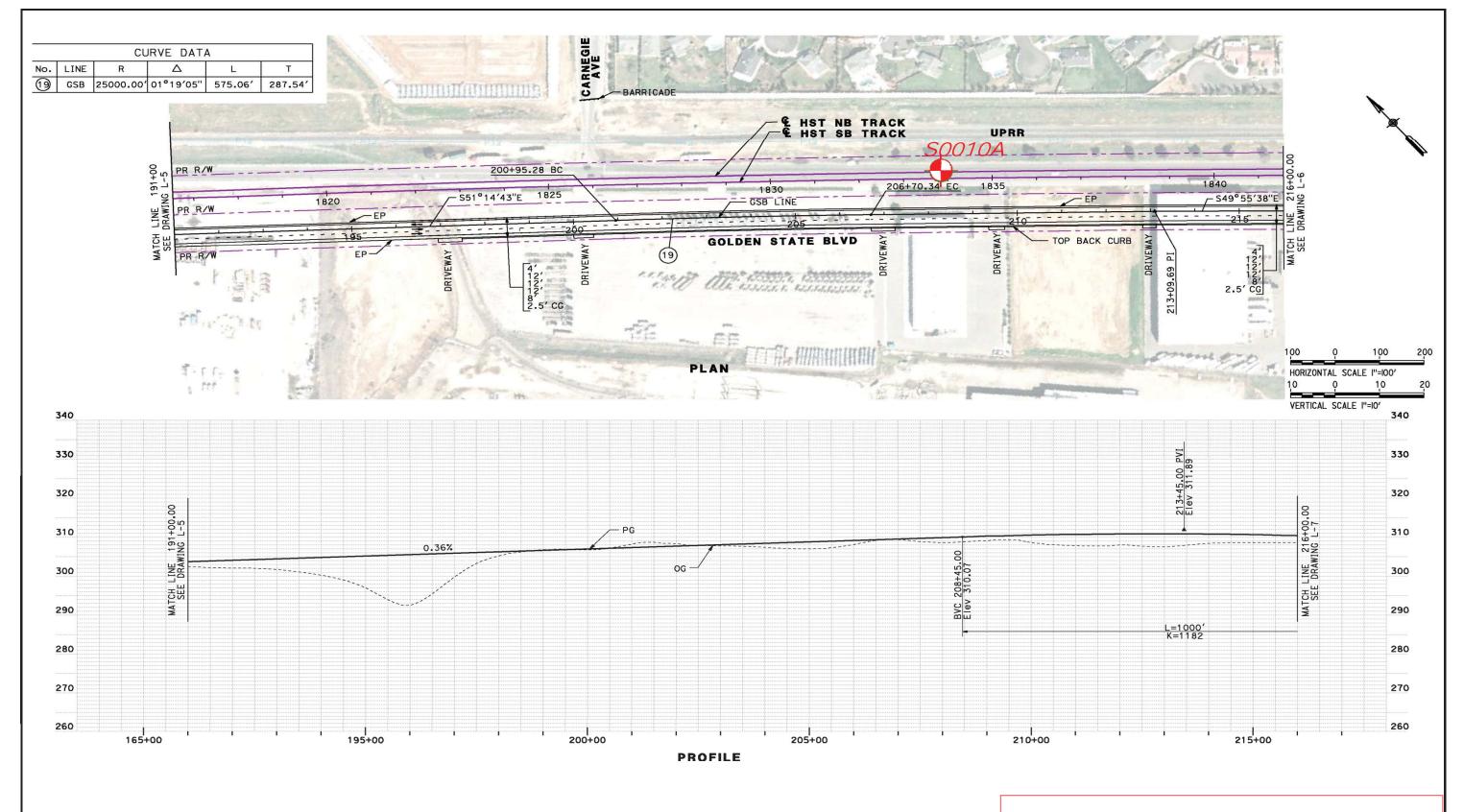
Approximate
Exploration Location

NOTES: THIS EXPLORATION LOCATION PLAN WAS MODIFIED FROM THE RECORD SET 15% DESIGN SUBMITTAL BY AECOM AND CH2MHILL DATED APRIL 29, 2011.





MINIMUM ARRA-FUNDED SEGMENT MERCED TO FRESNO SECTION OF THE CALIFORNIA HIGH SPEED TRAIN PROJECT



LEGEND

Approximate
Exploration Location

NOTES: THIS EXPLORATION LOCATION PLAN WAS MODIFIED FROM THE RECORD SET 15% DESIGN SUBMITTAL BY AECOM AND CH2MHILL DATED APRIL 29, 2011.





MINIMUM ARRA-FUNDED SEGMENT MERCED TO FRESNO SECTION OF THE CALIFORNIA HIGH SPEED TRAIN PROJECT

		GROUP SYMBO							
Graphic	/ Symbol	Group Names	Graphic	/ Symbol	Group Names				
	GW	Well-graded GRAVEL Well-graded GRAVEL with SAND		CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY				
0000	GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND		52	SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND				
	GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND		CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY				
	GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)		OL-IVIL	SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND				
	GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND		ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT				
	GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)			SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND				
600	GM	SILTY GRAVEL SILTY GRAVEL with SAND		OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY				
	GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND			SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND				
	GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND		OL	ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT				
	SW	Well-graded SAND Well-graded SAND with GRAVEL			SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND				
11	SP	Poorly graded SAND Poorly graded SAND with GRAVEL Well-graded SAND with SILT		СН	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY SANDY fat CLAY SANDY fat CLAY				
	SW-SM	Well-graded SAND with SILT and GRAVEL  Well-graded SAND with CLAY (or SILTY CLAY)			GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND Elastic SILT				
	SW-SC	Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)	-	МН	Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT				
	SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL			SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND				
	SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)		ОН	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY				
	SM	SILTY SAND SILTY SAND with GRAVEL			SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND				
	SC	CLAYEY SAND CLAYEY SAND with GRAVEL		ОН	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT				
	SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL			SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND				
7 7 7 7 7 7 7 7 7 7 7	PT	PEAT	]  -  -  -  -  -	OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL				
		COBBLES COBBLES and BOULDERS BOULDERS	]  -  -  -  -  -	02011	SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND				

	FIELD AND LABORATORY TESTS
С	Consolidation (ASTM D 2435-04)
CL	Collapse Potential (ASTM D 5333-03)
CP	Compaction Curve (CTM 216 - 06)
CR	Corrosion, Sulfates, Chlorides (CTM 643 - 99; CTM 417 - 06; CTM 422 - 06)
CU	Consolidated Undrained Triaxial (ASTM D 4767-02)
DS	Direct Shear (ASTM D 3080-04)
EI	Expansion Index (ASTM D 4829-03)
M	Moisture Content (ASTM D 2216-05)
ОС	Organic Content (ASTM D 2974-07)
Р	Permeability (CTM 220 - 05)
PA	Particle Size Analysis (ASTM D 422-63 [2002])
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89-02, AASHTO T 90-00)
PL	Point Load Index (ASTM D 5731-05)
PM	Pressure Meter
PP	Pocket Penetrometer
R	R-Value (CTM 301 - 00)
SE	Sand Equivalent (CTM 217 - 99)
SG	Specific Gravity (AASHTO T 100-06)
SL	Shrinkage Limit (ASTM D 427-04)
SW	Swell Potential (ASTM D 4546-03)
TV	Pocket Torvane
UC	Unconfined Compression - Soil (ASTM D 2166-06) Unconfined Compression - Rock (ASTM D 2938-95)
UU	Unconsolidated Undrained Triaxial (ASTM D 2850-03)
UW	Unit Weight (ASTM D 4767-04)
VS	Vane Shear (AASHTO T 223-96 [2004])
	SAMPLER GRAPHIC SYMBOLS
	Standard Penetration Test (SPT)
	1
X	Standard California Sampler
X	Standard California Sampler  Modified California Sampler

## Rotary Drilling Dynamic Cone or Hand Driven Diamond Core

#### WATER LEVEL SYMBOLS

NX Rock Core

**Bulk Sample** 

▼ Static Water Level Reading (short-term)

▼ Static Water Level Reading (long-term)



Auger Drilling

#### MINIMUM ARRA-FUNDED SEGMENT

Merced to Fresno Section of the California High-Speed Train Project,

Date: 10/26/2011 Job No.: 2009-138-400

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate:

**HQ Rock Core** 

Other (see remarks)

A-1A

CONSISTENCY OF COHESIVE SOILS								
Descriptor Unconfined Compressive Strength (tsf)		Field Approximation						
< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist					
0.25 - 0.50	0.25 - 0.50	0.12 - 0.25	Easily penetrated several inches by thumb					
0.50 - 1.0	0.50 - 1.0	0.25 - 0.50	Can be penetrated several inches by thumb with moderate effort					
1.0 - 2.0	1.0 - 2.0	0.50 - 1.0	Readily indented by thumb but penetrated only with great effort					
2.0 - 4.0 > 4.0	2.0 - 4.0 > 4.0	1.0 - 2.0 > 2.0	Readily indented by thumbnail Indented by thumbnail with difficulty					
	Unconfined Compressive Strength (tsf)  < 0.25  0.25 - 0.50  0.50 - 1.0  1.0 - 2.0  2.0 - 4.0	Unconfined Compressive Strength (tsf)         Pocket Penetrometer (tsf)           < 0.25	Unconfined Compressive Strength (tsf)         Pocket Penetrometer (tsf)         Torvane (tsf)           < 0.25					

APPARENT DE	NSITY OF COHESIONLESS SOILS
Descriptor	SPT N <sub>60</sub> - Value (blows / foot)
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

	MOISTURE						
Descriptor	Descriptor Criteria						
Dry	Absence of moisture, dusty, dry to the touch						
Moist	Damp but no visible water						
Wet	Visible free water, usually soil is below water table						

PERCENT	OR PROPORTION OF SOILS					
Descriptor	Criteria					
Trace	Particles are present but estimated to be less than 5%					
Few	5 to 10%					
Little	15 to 25%					
Some	30 to 45%					
Mostly	50 to 100%					

SOIL PARTICLE SIZE							
Descriptor		Size					
Boulder		> 12 inches					
Cobble		3 to 12 inches					
Gravel	Coarse	3/4 inch to 3 inches					
Gravei	Fine	No. 4 Sieve to 3/4 inch					
	Coarse	No. 10 Sieve to No. 4 Sieve					
Sand	Medium	No. 40 Sieve to No. 10 Sieve					
	Fine	No. 200 Sieve to No. 40 Sieve					
Silt and Clay		Passing No. 200 Sieve					

	PLASTICITY OF FINE-GRAINED SOILS					
Descriptor Criteria						
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.					
Low	The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.					
Medium	The thread is easy to roll, and not much time is required to reach the plastic limit; it cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.					
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.					

	CEMENTATION
Descriptor	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

 $\underline{\textbf{NOTE}}\!:$  This legend sheet provides descriptors and associated criteria for required soil description components only.

**REFERENCE**: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).



#### MINIMUM ARRA-FUNDED SEGMENT

Merced to Fresno Section of the California High-Speed Train Project,

Date: 10/26/2011 Job No.: 2009-138-400

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate:

LOGGED B		BEGIN DATE 10-26-11	COMPLETION DATE 10-26-11	36° 46					or North	ı/East a	nd Datur	n)		OLE SO(	D01A		
DRILLING (		ACTOR Igineering Services	s, Inc.	BOREHO STA 2			ΓΙΟΝ (C	ffset, St	ation, Li	ine)			S	SURFACE ELEVATION			
DRILLING I				DRILL RI	_									OREI <b>8 in</b>	HOLE DIAMETER		
SAMPLER	TYPE(S	) AND SIZE(S) (ID) - SPT (1.4" I.D.)			SPT HAMMER TYPE  140 lbs							HAMMER EFFICIENCY, ERI  87%					
-	E BACKI	FILL AND COMPLETION		GROUNE READING	)WA	ATER	DURIN	G DRILL			DRILLIN		E) T		DEPTH OF BORING	_	
ELEVATION (ft)			ESCRIPTION		Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)		Drilling Method Casing Depth			
1 2 3	≥0	CLAYEY SAND (SC); moist; mostly fine SAI Trace fine GRAVEL;	(+#4=2.1%, -#200=28.	ation. 5%).	S	S	8	8	2	0 3	S (t	ж.	м.		PA		
5		SILTY SAND (SM); ve moist; mostly fine SAI SILTY SAND with GR brown; moist; some fi	ery dense; light grayish ND; (+#4=2.1%, -#200 AVEL (SM); loose; lig ne GRAVEL; mostly fi	=32.7%).	X	S02	5 4 3	7	1			56		{{ {{	PA, R, CP (Bulk 2'-5') PA		
7 8 9 10	8 9				V	S03	3 6	13				67					
12							7		1					\ \ \ \ \ \	PA		
14   15   Light grayish brown.					X	S04	3 5 7	12	0			72		<b>}</b>			
20 21 22 23	$\blacksquare ::$	Poorly graded SAND grayish brown; moist; -#200=2.9%).	(SP); medium dense; mostly fine SAND; (+#	light #4=0%,	X	S05	3 7 8	15	1			89			PA		
24			(continued)													_	
		IFORNIA	• Contained)								DED S				ain Project,	_	

Date: 10/26/2011

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete

interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Job No.: 2009-138-400

Plate:

A-2A

A-2B

ELEVATION (ft)	і DЕРТН (ft)	Material Graphics	DESCRIPTIO	N	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method	Remarks
	26		SANDY SILT (ML); stiff; light yello mostly fine SAND.	wish brown; moist;	X	S06	13 27 28	55	3			83		}	
	27		SILTY SAND (SM); dense; light gr mostly fine SAND.	ayish brown; moist;											
	29		mostly fine SAND.												
	30		Dense.		X	S07	14 18 18	36	1			72			
	32													}	
	34														
	35					S08	5 8 13	21	1			78		}	
	37													}	
	38		CLAYEY SAND (SC); dense; light mostly fine SAND.	brown; moist;											
	40		Very dense.		X	S09	25 33 50/2"	83/8				72			
	42		SANDY SILT (ML); hard; light yell mostly fine SAND; ( -#200=51.4%	owish brown; moist; ).			30/2		6						PA
	43														
	45				V	S10	39 60/5"	60/5				61		}	
	46				Δ										
	48		SILTY SAND (SM); dense; olive g medium to fine SAND.	ray; moist; mostly											
	50				V	S11	8	51	1			72		}	
	51				Λ		22 29								
	53		Lean CLAY with SAND (CL); hard moist; mostly fine SAND; low to n fines.	; light grayish brown; nedium plasticity	1										
	54														
6			(continued)				MIN	IMUM	ARRA	A-FUN	IDED S	SEGM	IENT		
	TY	ALI	FORNIA or teasing the ground	Merced Date: 10/26/201		Fres	no Se	ection	of the						ain Project,
			e report prepared by Parikh Consultants	Is, Inc. for the named pr	ojec					with the		for com	nplete		Plate:

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method	Remarks
	56		SILT (ML); hard; light grayish brown; moist; some fines. <i>layer description continued from previous pag</i>	е	S12	6 25 63	88				72		{	PI, UU
	57													Pl
	59		CLAYEY SAND (SC); very dense; reddish black; moist; mostly fine SAND.											
	60		(+#4=0%, -#200=39.8%).		S13	19	60/5				72			
	61			1		60/5"		9						PA
	62													
	64													
	65	// TH	SILTY SAND (SM); very dense; brown; moist; mostly fine SAND.	$\downarrow$	S14	23	60/3	11	115		50			
	66		fine SAND.	M		60/3"								DS
	67													
	68													
	70				S15	25	60/2				44			
	71				010	60/2"	00/2							CL
	72		SANDY lean CLAY (CL); hard; yellowish brown; mois mostly fine SAND; low to medium plasticity fines.	t;										
	73		moon, mo o. a.e., on to modalin placesty moon										$\left  \left  \left  \right  \right  \right $	
	74 75		SILT (ML); hard; brown; moist; some SILT.		0.10					DD - > 4				
	76				S16	5 12 15	27	14	93	PP = >4	67			
	77												}	
	78												$ \{ $	
	79 -		SILT with SAND (ML); hard; light grayish brown; mois little fine SAND; mostly fines.	st;										
	81				S17	9 22 33	55	20	97	PP = >4	83			
	82													
	83													
	84													
	_85_ <del> </del>		(continued)	-								-	1711	_
	ily	ALI	FORNIA Merce	ed to	Fres					IDED S fornia			d Ti	rain Project,
This		-611	Date: 10/26/2		-4 - · · · · · · · · · · · · · · · · · ·	h 1.1.1				ob No.			-400	
interpre	tation.	This s	e report prepared by Parikh Consultants, Inc. for the named summary applies only at the location of this boring and at th ocation with the passage of time. The data presented is a s	e time	of drill	ing. Su	bsurface	conditi	ons ma	y differ a			ns ar	Plate: A-2C

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTIO	N	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method	Remarks	
	86		SILT with SAND (ML) (continued).		N	S18	18 27	59				83		Y		
			SILTY SAND (SM); very dense; ha mostly fine SAND; (-#200=34.8%)	ard; brown; moist;			32		7	103					PA	
	87															
	88															
	89															
	90				7	S19	25	104/9	14	105		78				
	91				X		44 60/3"									
	92															
	93															
	94															
	95		Yellowish brown; moist; some med	dium to fine SAND.												
	96				M	S20	31 60/6"	60/6	14	91		56				
	97													$ \{\} $		
	98													Y		
	99													$  \mathbf{k}  $		
	100		(+#4=0%, -#200=26.4%).		7	S21	24	113/10				78		}		
	101				X		53 60/4"		14	97					PA	
	102															
	103		Oll T (MI) be and limbs are sink branch													
	104		SILT (ML); hard; light grayish brow	/n; moist.												
	105															
					M	S22	14 54	114/11	25	96	PP = >4	72				
	106						60/5"									
	107															
	108															
	109		SILTY SAND (SM); very dense; lig mostly fine SAND.	Int brown; moist;												
	110		Dense; light olive brown.			S23	7	49	26	93		83				
	111		-		X		20 29								DS	
	112															
	113															E
	114															
	115															
	113=	t lili.	(continued)											1/11		
	Ly	CALI	FORNIA	Mercec	l to	Fres		IMUM ection		_					rain Project,	
				Date: 10/26/201	1					J	ob No.	200	9-138	3-400	<u> </u>	
			e report prepared by Parikh Consultants summary applies only at the location of											ns an	Plate:	
			ocation with the passage of time. The												A-2D	)

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPT	ON	Sample Depth		Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method Casing Depth	Remarks
	116 = 117 = 118 = 119 = 119 = 119		Very dense; yellowish brown; we fine SAND. SILTY SAND (SM) (continued). SILTY SAND (SM); very dense; mostly fine SAND. layer descrip previous page		X	S24	12 27 31	58	31	90		89			
	120 121 122		Lean CLAY (CL); hard; light bro medium plasticity fines.	wn; wet; low to	X	S25	3 19 27	46				78			
	123		Boring terminated at planned de Bottom of borehole at 121.5 ft b	.pth. gs.											
	133														
	134		FORNIA LANGUETTA PROPERTY OF THE PROPERTY OF T	Merce	d to	Fres					IDED S				n Project,



A-2E

.ogge <b>L.S.</b> Drilli	Bha	ngo	BEGIN DATE COMPLETIO  10-31-11 10-31-11  ACTOR	36° 4	46' 4	8" / -	TION (L. 119° 5	0' 46"			nd Datur	n)			ID 002A ACE ELEVATION
RILLI	NG M	ETHC	ngineering Services, Inc.  D Auger	STA DRILL CME	203 RIG									BORE 8 in	HOLE DIAMETER
AMPL	_ER T ( <b>2.5</b> "	YPE(\$	S) AND SIZE(S) (ID) ) - SPT (1.4" I.D.)	SPT H. <b>140</b>	AMME <b>Ibs</b>								F	1AMN <b>87</b> %	MER EFFICIENCY, ERI
	HOLE T CE		(FILL AND COMPLETION NT	GROU READI		ATER				on 10	DRILLIN -31-20			ОТА <b>31.</b>	L DEPTH OF BORING
ELEVATION (#)	рертн (#)	Material	DESCRIPTION	l	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method	Remarks
	1		SILTY SAND (SM); dense; reddish mostly fine SAND; moderate to stro	brown; moist; ng cementation.										{	
	2		(+#4=0%, -#200=34.5%).		X	S01	7 9 13	22	5	114		72			PA
	4		:   	200=34.3%).										}	PA, CP, El (Bulk 2'-5') PA
	5 6		Very dense.		X	S02	10 19 35	54	8			83		\{\{\}	CR
	8 9 10 11 12 13 13 13 13 15 15 15 15 15 15 15 15 15 15 15 15 15		Medium dense; light reddish brown.		X	S03	3 9 16	25	11	116		100			DS
	14 15		Poorly graded SAND with SILT (SP	-SM); medium		S04	3 7 9	16	10			89		<b>}</b>	PA
	17 18		dense; light grayish brown; moist; m (+#4=0%, -#200=6.8%).	nostlý fine SAND;										}	
	20		Mostly coarse to medium SAND.		X	S05	3 4 8	12	6			89			
	22 23 24													}	
	25		(continued)											)}	
	Fly	CAL	(continued)			Fre				e Calif		High-	Spee		ain Project,
erpre	etation	n. Thi	he report prepared by Parikh Consultants, s summary applies only at the location of the location with the passage of time. The day	his boring and at th	proje	of dri	lling. Su	bsurface	e condit	with the	y differ a	for com	plete		Plate:

ELEVATION (ft)	DEPTH (ft)	rial hics	DESCRIPTION	N	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	(%)	Drilling Method Casing Depth	Remarks	
ELE	25 26	Material Graphics	Poorly graded SAND with SILT (SF		Sami	Samb 608	3 5	12	Moist	Dry (pcf)	Shea (tsf)	100	RQD (%)	Drillin Casir		
	<u>.                                    </u>		Poorly graded SAND (SP); medium grayish brown; moist; mostly fine S -#200=2.9%).	n dense; light AND; (+#4=0%,			7		4				_	\{\}	PA	
	30				V	S07	5 12	30	3			78				
	31 =		Boring terminated at planned depth	).	Λ		18							} _		
	33 = 34 = 35 =		Boring terminated at planned depth Bottom of borehole at 31.5 ft bgs.													
	36															
	38															
	E															
	44 <b>-</b> 45 <b>-</b> 46 <b>-</b>															
	47															
	49 50															
	51 =															
	53															
6	55		FORNIA D	Maur - d	4-	Evec					IDED S			al T	ain Project,	

Date: 10/26/2011

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete

interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Job No.: 2009-138-400

Plate:

<u>A-3B</u>

<u>A-5</u>A

L.S.	ED BY Bhangoo		36° 47	7' 9	" / -1 <i>′</i>	19° 51	' 9"			nd Datur	n)		S0	003 <b>A</b>
	ING CONTRA <b>hnicon En</b>	CTOR gineering Services, Inc.	BOREHO STA 2			TION (O	ffset, St	ation, L	ine)			\$	SURF	FACE ELEVATION
	ING METHOD		DRILL R										BORE 8 ir	EHOLE DIAMETER 1
SAMP	LER TYPE(S)	AND SIZE(S) (ID)	SPT HAI	MME	R TYP	Έ						F	IMAH	MER EFFICIENCY, ERI
BORE	HOLE BACKE	- SPT (1.4" I.D.) FILL AND COMPLETION	140 lk	DWA	ATER							TE) 1		AL DEPTH OF BORING
	AT CEMEN	<b>T</b> 	READIN	GS T		Not e	ncoun	tered		-31-201	11		31.	5 ft
ELEVATION (ft)	DEPTH (ft) Material Graphics	DESCRIPTIO	N	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method	ttd ded Remarks billing
	1	SILTY SAND (SM); very dense; re mostly fine SAND; moderate to str	ddish brown; moist; ong cementation.										}	
	3	(+#4=0%, -#200=31.1%).		X	S01	8 25 50/2"	75/8	10	110		67		<b>}</b>	PA
	5	Trace fine GRAVEL; (+#4=2.3%, -	#200=33.3%).		S02	12	37	15			72		$\left  \right $	PA, CP (Bulk 2'-5') PA
	6 7	Very dense; brown; some fine SAI	ND.	X	502	25 12	3/	15			12		{	CR
	9 10 11 11 12 12 13 13 13 15 15	Medium dense; dark grayish brow SAND.	n; mostly fine	X	S03	5 9 13	22	14	99		100			DS
	14 15 16 17 17 17 17 17 17 17 17 17 17 17 17 17	Poorly graded SAND (SP); loose; moist; mostly fine SAND; (+#4=0%	light grayish brown; 6, -#200=2.4%).	<u> </u>	S04	2 3 4	7	3			100		}	PA
	18 19 20 20			V	S05	2 4	11	3			100		}	
	22 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Medium dense; mostly coarse to r	nedium SAND.			7							<b>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</b>	
	25												)}	
	ELYCALI Managari	(continued)	Merce	d to	Fres					IDED S			d T	rain Project,
_			Date: 10/26/20	11					J	ob No.:	200	9-138	-400	)

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

ELEVATION (ft)	й DEPTH (ft) Material Graphics	DESCRIPTIO		Sample Depth Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method Casing Depth	Remark	s
	26 = 27 = 28 =	Poorly graded SAND (SP); loose; moist; mostly fine SAND; (+#4=0%\average\) acription continued from Poorly graded SAND (SP) (contine Poorly graded SAND with SILT (S grayish brown; moist; mostly fine \$-#200=7.3%).	light grayish brown; 6, -#200=2.4%). previous page ued). P-SM); dense; light SAND; (+#4=0%,	S06	6 11 11	22	6			89			PA	
	30 = 31 = 32 = 33 = 34 = 34 = 34	Medium dense.  Boring terminated at planned dept Bottom of borehole at 31.5 ft bgs.	h.	S07	6 11 16	27	4	99		83				
	35 = 36 = 37 = 38 = 38													
	39 = 40 = 41 = 42 = 42													
	43 = 44 = 45 = 46 = 46 = 46													
	48 49 50													
	51 = 52 = 53 = 54 = 54 = 55													
	55							A-FUN						•

ELYCALIFORNIA Visitade mere baseni filis product

PCI-CT 5 BR COP

Merced to Fresno Section of the California High-Speed Train Project,

Date: 10/26/2011 Job No.: 2009-138-400

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate:

A-5B

L.S.		ngoo	11-1-11 11-1		36° 47					or North	n/East a	nd Datur	m) 		S0	005A
		ONTRA	CTOR gineering Services, Inc.		BOREHO STA 1			TION (O	ffset, St	ation, L	ine)			5	SURF	FACE ELEVATION
RILLI	NG M	ETHOD	· · ·		DRILL RI	G									BORE 8 in	EHOLE DIAMETER
SAMPL	ER T	YPE(S)	AND SIZE(S) (ID)		SPT HAN	ИΜЕ	R TYP	E						ŀ	HAMI	MER EFFICIENCY, ERI
BORE	HOLE	BACKF	- SPT (1.4" I.D.) FILL AND COMPLETION		140 lb	DWA	TER	DURIN	G DRILI	ING		DRILLIN		TE)		AL DEPTH OF BORING
	T CI	MEN	<b>T</b>		READING	3S						t on 11	-1-11		121	.5 ft
ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIP	PTION		Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method	Remarks
	1 2		SILTY SAND (SM); very dens mostly fine SAND.												<i>}</i>	
	3		SILTY SAND with GRAVEL (5 brown; moist; little fine GRAV (+#4=17.6%, #200=32.5%). (+#4=12.1%, #200=37.2%). SANDY lean CLAY (CL); very	EL; mostly fine S	SAÑD;	X	S01	6 50/6"	50/6	4			56		<i>{</i>	PA
	5		moist; little fine SAND; low to	medium plastici	ty fines.	M	S02	6 8	21			PP = 2.5	100			PA, R, CP (Bulk 2'-5') PA
	7		Lean CLAY (CL); very stiff; re medium plasticity fines.	ddish brown; mo	ist;			13		14						PI, CR PI
	9		SILT with SAND (ML); very st moist; some fine SAND.	iff; light grayish b	orown;											
	10 11 12		(+#4=0%, -#200=71.7%).			X	S03	7 12 16	28	12	103	PP = 2.5	72		<b>}</b>	PA
	13		SILTY SAND (SM); dense; ye mostly fine SAND.	llowish brown; m	noist;										}	
	15 16		Dense.			X	S04	7 8 16	24	17			89		\{\}	PA
	18															
	20		Medium dense.			M	S05	5 6 10	16	16			100			
	22		CLAYEY SAND (SC); dense; moist; mostly fine SAND.	light yellowish br	own;										}	
	24 25		moist; mostly fine SAND.												}	
	Z.	CALI	FORNIA A MANUSCRIPTOR PRIMARY	,	Merced	d to	Fres					IDED S			d Tı	rain Project,
	a ie ra	ort of th	e report prepared by Parikh Consu	Date: 1				ط ادار د حا	- rood t			ob No.:			-400	Plate:

Plate:

<u>A-6</u>B

ELEVATION (ft)	й DЕРТН (#)	Material Graphics	DESCRIPTION		Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method	Re Billis	marks	
	26 <b>2</b> 7 <b>2</b> 8 <b>2</b> 8		SANDY SILT (ML); hard; light yello mostly fine SAND; (-#200=66.8%).		X	S06	12 18 22	40	23			100		<del>}</del>	PA		
	29		SILTY SAND (SM); dense; yellowis mostly medium SAND; few fines.											{  			
	31 =		Poorly graded SAND (SP); dense; mostly medium SAND.	light brown; moist;	X	S07	9 16 20	36	4	101		89		<b>}</b>	DS		
	33 34 35													}			
	36		Medium dense; wet.			S08	5 7 13	20	23			89					
	38 39 40					S09	9	30				100		}			
	41 42 43		Poorly graded SAND with SILT (SF yellowish brown; wet; mostly mediu (+#4=0%, -#200=5.6%).	P-SM); dense; m SAND;	-X		14 16		24					}	PA		
	44 45		Medium dense.		M	S10	9	19	23			89					
	46 <b>4</b> 7 <b>4</b> 8 <b>4</b> 8				Å		9 10							}			
	49					S11	17	58	6	104		83		<b>}</b>			
	51 =		SILTY SAND (SM); very dense; ye mostly medium SAND; few fines; y light gray.	lowish brown; wet; ellowish brown to	X		25 33							\{\{\}			
009-150-400.5F3 DATA TENTENTE.5D1 12.12/11	53 54 55																
	11y	ALII	(continued)	Merced  Date: 10/26/201		Fres				Calif	IDED S	High-	Spee		rain Proje	ect,	

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate:

<u>A-6C</u>

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTIO	N	Sample Depth		Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method	המאור המ	Remarks	
	56		SILTY SAND (SM) (continued).	2010	$\bigvee$	S12	10 11	24	0.4			100		{	PA		
	57		Poorly graded SAND with SILT (SI yellowish brown; wet; mostly fine S +#200=6.5%).	7-SM); dense; AND; (+#4=0%,			13		21					{	PA		
	58													{[			
	59																
	60		Mostly medium to fine SAND.			S13	11	30	20			89					
	61				V		14 16										
	62													}			
	63																
	64																
	66				X	S14	18 27 30	57	9	102		78		{[	DC		
	67		SILTY SAND (SM); dense; light gr SAND.	ay; wet; mostly fine			30								DS		
	68																
	69																
	70					S15	8	44	30		PP = 3.25	83		}	PA		
	71		SILT with SAND (ML); very stiff; lic fine SAND; (+#4=0%, -#200=77.3	ht gray; wet; mostly	$ \sqrt{} $		11 33				3.25			}	PA		
	72		IIIC OAND, (1#4-070, 1#200-11.5)	0).													
	73													{[			Ī
	74 75																
	76				N	S16	21 27 30	57	23	105		78					
	77		Hard.				30										
_	78													}			
1/21/21	79																Ħ
200	80				$\bigvee$	S17	50/6"	REF				33					
	81		SILTY SAND (SM); very dense; lig fine SAND; (+#4=14.2%, -#200=16	ht gray; wet; mostly	abla				33						PA		
	82		5. 0.12, ( 11.270, 11.200 10														
	83																
009-1-30-400.GF3 DATA TENTERALE.GD1 12.1.2/11	84				_												
			(continued)				14111/1	18/11/8/	ADD.	\ EIIL	IDED (	SEC NA	ENT				7
		CALI	FORNIA	Merced	to	Fres					IDED S ornia l			d Tr	ain P	roject,	
7 KB 0	144	Mhout eve	Pearling the ground	Date: 10/26/201							ob No.:					- '	╛

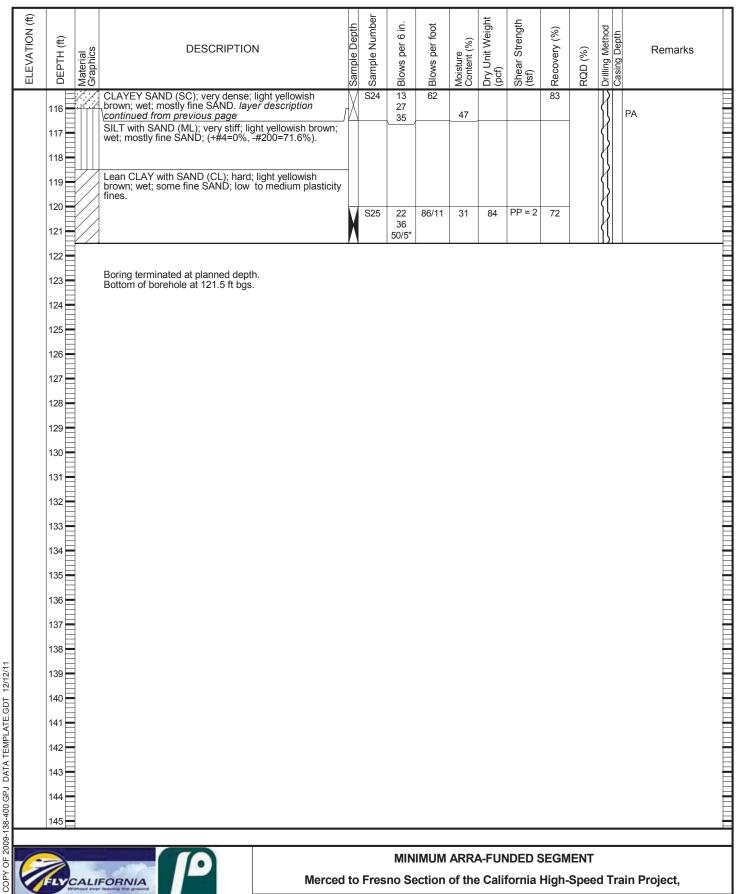
This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate:

<u>A-6</u>D

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	ı	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method	Remarks
	86		SILTY SAND (SM) (continued).		X	S18	20 21	42				72		}	
	87		Poorly graded SAND with SILT (SF dark brown; wet; mostly fine SAND -#200=10.6%).	?-SM); very dense; ; (+#4=0%,			21		22					}	PA
	88		SANDY lean CLAY (CL); very stiff; fine SAND; low plasticity fines.	brown; wet; little										{	
	90				V	S19	28 50/2"	50/2	32			44			
	91 92		SILT with SAND (ML); hard; light g mostly fine SAND.	rayish brown; wet;	7/									}	
	93													{	
	95				V	S20	21 50/5"	50/5	31	89	PP = >4	44		<b>{</b>	
	96													}	
	98													}	
	100		SILTY SAND (SM); very dense; ligi moist; mostly fine SAND; (+#4=0%	nt grayish brown;	V	S21	30 34	85			PP = 1.75	72			
	101			,	$\Lambda$		51		27					}	PA
	103													<b>}</b>	
	104					S22	9	54	23	101		78			
	106		Dense; yellowish brown; mostly me weak cementation.	dium to fine SAND;	X	322	17 37		23	101		76		{	DS
	107														
12121	109														
009-130-400.6F3 DAIA IENTEAIE.6D1 12.12/11	110				X	S23	17 17 18	35	24			72			
	112		SILT with SAND (ML); very stiff; lig wet; some fine SAND.	ht yellowish brown;										$\left  \right $	
CGPJ DA	113														
38-400	115	///												<u>}</u>	
1-6002			(continued)												
10 YO (	T.V.	ALI	FORNIA	Merced	to	Fres					IDED S ornia l			d Tra	ain Project,
2 X	w	thout eve	tearing the ground	Date: 10/26/201							ob No.:				-

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.



10/26/2011

interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete

Job No.: 2009-138-400

Plate:

A-6E

Date:

may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

PCI-CT 5 BR COPY (

LOGGED BY BEGIN DATE COMPLETION DATE 10-31-11					BOREHOLE LOCATION (Lat/Long or North/East and Datum) 36° 47' 59" / -119° 52' 5"									HOLE ID S0006A			
DRILLING CONTRACTOR  Technicon Engineering Services, Inc.				BOREHOLE LOCATION (Offset, Station, Line) STA 1939+50										SURFACE ELEVATION			
DRILLING METHOD  Hollow-Stem Auger				DRILL RIG CME 55									BOREHOLE DIAMETER 8 in				
SAMPLER TYPE(S) AND SIZE(S) (ID)  MC (2.5" I.D.) - SPT (1.4" I.D.)				SPT HAMMER TYPE 140 lbs										HAMMER EFFICIENCY, ERI  87%			
BOREHOLE BACKFILL AND COMPLETION  NEAT CEMENT				GROUNDWATER DURING DRILLING AFTER DRILLING (DATE)													
	CEIVIE	:N I	, including the second	ZADIINO			Not encountered on										
ELEVATION (ft)	DEPTH (ft)	Graphics DESC	CRIPTION		Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method	Remarks		
	1	SILTY SAND (SM); medi moist; mostly fine SAND.	um dense; reddish brow	/n;										{}			
	2	:: - 			V	S01	12 6	14				100					
	3 4	(+#4=0%, -#200=33.1%).			<u> </u>		8								R, PA, CP (Bulk 2'-5')		
	5				M.	S02	13 35	61	11			100			PA		
	6 <b>-</b>	Very dense; yellowish bro	own; mostly fine SAND.		/\_		26								CR		
	8	:															
	9 10						2	11				100					
	11	:   	GRAVEL; mostly fine 0=16.8%).		<u>X</u>	S03	4 7		6	101					PA		
	12		ŕ														
	14																
	15	Dearly graded CAND (CC		4a	X	S04	4 6 5	11	4	98		89			DS		
	17	Poorly graded SAND (SF light gray; moist; mostly f	ne SAND.	n to											DS		
	18	SANDY lean CLAY (CL); to medium plasticity fines	SANDY lean CLAY (CL); very stiff; brown; moist; o medium plasticity fines.														
	20				M	S05	2 5	19				72					
	21	Lean CLAY (CL); very sti plasticity fines.	ff; black; moist; medium	1	1		14		17						PI		
	23	SILTY SAND (SM); very dense; light grayish brown;															
	24	moist; mostly fine SANĎ.															
		(00	ontinued)						45-		IDES :	25.5					
	TIYCA	LIFORNIA and having the ground	М	MINIMUM ARRA-FUNDED SEGMENT  Merced to Fresno Section of the California High-Speed Train Project,										rain Project,			
_			Date: 10/2	26/2011	1					J	ob No.	: 200	9-138	-400	 		

interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

ELEVATION (ft)	25 DEPTH (ft)	Material Graphics	DESCRIPTIO		Sample Depth		Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method		Remarks	
	26 <b>2</b> 7 <b>2</b> 8 <b>2</b> 9		SILTY SAND (SM); very dense; lig moist; mostly fine SAND. layer de from previous page SILTY SAND (SM) (continued). SANDY SILT (ML); hard; light gra mostly fine SAND; (+#4=0%, -#20		<u> </u>	S06	6 30 44	74	11			72		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	PA		
	30 31 32 33 34 34 34 34 31 31 31 31 31 31 31 31 31 31 31 31 31		Boring terminated at planned dept Bottom of borehole at 31.5 ft bgs.	h.	X	S07	6 21 50/3"	71/9	30	92	PP = >4	78					
	35 <b>3</b> 6 <b>3</b> 7 <b>3</b> 8																
	39 40 41 42 42																
	43 <b>4</b> 4 <b>4</b> 5 <b>4</b> 6 <b>4</b> 6																
	47 48 49 50																
	51 <b>=</b> 52 <b>=</b> 53 <b>=</b> 54 <b>=</b>																
	155	ALI	FORNIA Navery life ground	Merced	to	Fres					DED S			d Tra	ain P	roject,	

Date: 10/26/2011

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete

interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Job No.: 2009-138-400

Plate:

A-7B

	3hango		BEGIN DATE 10-31-11	COMPLETION 10-31-11		36° 48	3' 13	3" / -	119° 5	2' 21"			nd Datur	n)		SC	E ID 0007/		
Techi		Engi	OR neering Service	es, Inc.		STA 1	917		TION (C	Offset, St	ation, L	ne)						LEVATION	
	G METH w-Sten		ger			DRILL RI										30R <b>8 i</b> i		DIAMETER	
			ND SIZE(S) (ID) SPT (1.4" I.D.)			SPT HAN		R TYF	PΕ							1AM <b>87</b> 9		FICIENCY, ERI	
BOREH		KFILL	AND COMPLETION	١		GROUNI READING	OWA	TER					DRILLIN		TE) 1	ГОТ		TH OF BORING	
	<u> </u>							Jec			10.00								_
ELEVATION (ft)	DEPTH (ft) Material	Graphics		ESCRIPTIO			Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	<b>Drilling Method</b>	Casing Depth	Remarks	
	1	S	ILTY SAND (SM); nostly fine SAND; n	very dense; re noderate to str	ddish brow ong cemen	n; moist; tation.										$\left\{ \right\}$			
	2						H	S01	2	63/11			PP = >4	61		$\left  \left\{ \right  \right $			
	3	(-	+#4=0%, -#200=30	.4%).			X		13 50/5"		7	117					PA		
	4	Т	race fine GRAVEL	; (+#4=4%, -#2	200=26.3%	).										$\left  \right $	PA		
	5	N	ledium dense; gray	rish brown.			$\bigvee$	S02	9 6	10	13			89		<b> </b>			
	6						Δ		4							}	CR		
	7															<b> </b>			
	8																		
	9																		
	11						M	S03	6 7 10	17	20			100		{[			
	12								10										
	13															<b>}</b>			
	14																		
	15						V	S04	13	50/5			PP = >4	56		}			
	16	v	ery dense; light yel nedium SAND; (+#4	lowish brown;	mostly coa	rse to	À		50/5"		8	120				}	PA		
	17	m	nedium SAND; (+#4	1=0%, -#200=2	29.7%).														
	18																		
	19															{[			
	20						M	S05	3 9	21	2			100					
	21	l I N	ledium dense; yello	owish brown; n	nostly fine S	SAND.	A		12										
	23															}}			
	24																		
	25			(continued)												]}			_
<u></u>				(continued)					MIN	IMUM	ARRA	A-FUN	IDED S	SEGM	ENT				-
1	LYCA	LIFC	DRNIA			Merced	d to	Fres								d T	rain P	roject,	
_					Date: 1	10/26/201	11					J	ob No.:	200	9-138	-400	0		_

interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

ELEVATION (ft)	S DEPTH (ft)	Material Graphics	DESCRIPTIO	N	Sample Depth		Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method Casing Depth		Remarks	
	26 27 28 29 30		SILTY SAND (SM); very dense; re mostly fine SAND; moderate to str Nayer description continued from p SILTY SAND (SM) (continued). Poorly graded SAND (SP); mediur grayish brown; mostly fine SAND; (+#4=0%, -#200=4.6%).	ddish brown; moist; rong cementation. previous page  m dense; light trace fines;	S0 S0	9 12	21	3	95		100			PA		
	47 48 49 50		Mostly medium to fine SAND.  Boring terminated at planned dept Bottom of borehole at 31.5 ft bgs.	h.	Λ	16								DS		
	55		10			IIM	NIMUM	ARRA	4-FUN	IDED :	SEGN	IENT	1			

PCI-CT 5 BR COPY OF 2

WCALIFORNIA

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Date: 10/26/2011

Plate:

Merced to Fresno Section of the California High-Speed Train Project,

Job No.: 2009-138-400

CLAYEY SAND (SC), very dense; reddish brown; moist; mostly fine SAND.   S02   15   38	DGGED BY <b>S. Bhangoo</b> RILLING CONTRACT		1 36° 4	18' 3 10LE	0" / -	119° 5				nd Datun	n)			ID 008A ACE ELEVATION
C(2.5*1(D.) - SPT (1.4*1(D.)   37%	ILLING METHOD	ıger	DRILL I	RIG . <b>55</b>		DE .							8.5 i	in
DESCRIPTION    Gall   G	IC (2.5" I.D.) - S	SPT (1.4" I.D.)	140 I	bs NDW/			G DRILL					ΓE) 1	<b>87%</b> FOTAI	L DEPTH OF BORING
Silt_TY_SAND_(SM); very dense; reddish brown; moist, mostly fine SAND; moderate comentation.   Solid to the state of the			READII	NGS	_						0-27-1	1	121.	.5 ft
SO1   18   60/6   4   125   66				Sample Depth	Sample Numbe	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weigh (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method	Remarks
CLAYEY SAND (SC); very dense; reddish brown; moist; mostly fine SAND.   SOZ 15 38   9     SANDY SILT (ML); stiff; reddish brown; moist; mostly fine SAND; mostly fines; (-#200=49.90%).   SOZ 15 38   9     PA     PA     PA     PA     PA     PA     PA   PA     PA     PA	2	SILTY SAND (SM); very dense; ye noist; mostly fine SAND; moderat	ellowish brown; te cementation.	X	S01		60/6	4			56		<b>}</b>	
Lean CLAY (CL); very stiff; light grayish brown; moist; low to medium plasticity fines.  SILT (ML); hard; light grayish brown; moist.  SILT (ML); hard; light gr	5	CLAYEY SAND (SC); very dense; noist; mostly fine SAND. SANDY SILT (ML): stiff: reddish b	rown: moist: mostly		S02	18	38	9			61		}	PA
Sultry Sand (SM); dense; reddish brown; moist;   Sultry Sand (SM);	9 L L			; 	S03	12	41	33			78		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	PI, CR PI
18   19   20   20   20   21   20   20	14 15 16	SILTY SAND (SM); dense; reddisl	h brown; moist;	X	S04	26	48	25	96		72		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	
23 24 25 (continued)  MINIMUM ARRA-FUNDED SEGMENT	18 19 20	nostly fine SAND.		X	S05	24	63	7	104		72			PA
MINIMUM ARRA-FUNDED SEGMENT	23												\{\} \{\}	
		(continued)				25.1.	18.61.75.7	455		DES 3	\F-0			
Merced to Fresno Section of the California High-Speed Train Project,	FLY CALIFORNIA TO THE PROPERTY OF THE PROPERTY	ORNIA wenty the procured	Merce	ed to	Fres								d Tr	ain Project,
Date: 10/26/2011 Job No.: 2009-138-400  s log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete Plate:													-400	

A-9B

ELEVATION (ft)	Material Graphics	DESCRIPTIO		Sample Depth		Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method	Remarks	
26 27 28		SILTY SAND (SM); dense; reddish mostly fine SAND. layer description previous page (Olive brown. SILTY SAND (SM) (continued).	n brown; moist; on continued from	X	S06	17 32 43	75	7	114		78		<i>{</i> }	DS PA	
29 30 31 32		Dense; yellowish brown.			S07	7 11 16	27	4			100				
33 34 35 36 37 37 37 37 37 37 37 37 37 37 37 37 37		Very dense; light grayish brown; (+ -#200=14.6%).	#4=2.4%,		S08	10 22 42	64				89		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	PA	
38 = 39 = 40 = 41 = =		Reddish brown.			S09	7 38 42	80	16			89				
42 43 44 45 46 46 46				Y	S10	20 22 26	58	10	123		72		< >		
48 49						36									
50 51 52 53 54 54		Well-graded SAND with SILT (SW grayish brown; moist; mostly medic (+#4=0%, -#200=8.8%).	-SM); dense; light um to fine SAND;		S11	6 13 14	27	3			89			PA	
55	CALI	(continued)	<b>Mercec</b> Date: 10/26/201		Fres				Calif	IDED S	High-	Spee		ain Project,	

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

A-9C

interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and

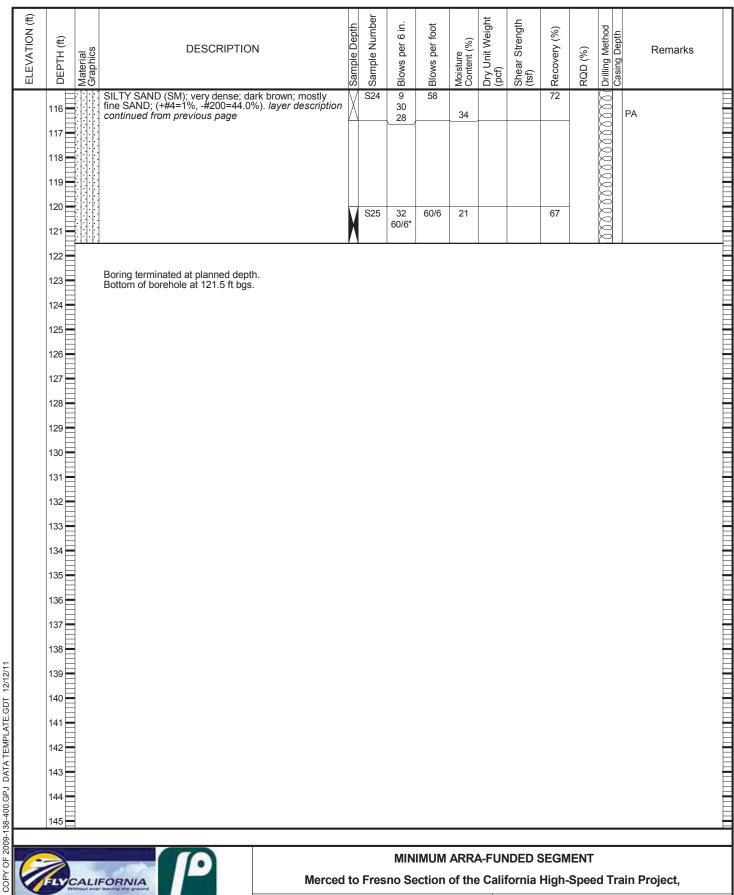
may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate:

<u> A-9D</u>

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTIO		Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method	Remarks	
	86		SILT with SAND (ML) (continued). SILT with SAND (ML); hard; yellow mostly fine SAND. layer description previous page	vish brown; moist; on continued from	X	S18	3 23 25	48	20	75		72		<b>}</b>	PI	
	88		SILTY SAND (SM); very dense; lig mostly fine SAND.	ht brown; moist;												
	90 91 92				X	S19	17 27 34	61				78		<b>} {</b>	DS	
	93		SILT with SAND (ML); very stiff; lig mostly fine SAND.	ght gray; moist;										<b>}</b>		
	95 96 97		SANDY SILT (ML); hard; light gray SAND; (+#4=0%, -#200=52.2%).	r; moist; mostly fine	X	S20	9 18 18	36	13			78		} }	PA	
	98 99		SILTY SAND (SM); very dense; lig mostly fine SAND.	ht gray; moist;												
	100				X	S21	13 28 32	60	17	91		72		} {{		
	102 103 104															
	105		Well-graded SAND with SILT (SW brown; wet; mostly medium to fine #200=8.1%).	-SM); very dense; SAND; (+#4=0%,	X	S22	14 23 32	55	12			83		} {{	PA	
-	107 108 109															
09-100-400.0F	110				X	S23	11 26 33	59	15			72	0	))		
	112 113	-											(	0000000		
2	115_	^ <u> </u>	(continued)		×								(	) ( ( (		
PAN TO LA		2011	(continued)	Marcad	l to	Free					IDED S			l Tr	ain Project,	
2		thout ave	FORNIA  Theoreting Still Ground	Date: 10/26/201		- 1163		,50011	Ji 1110		ob No.:					$\dashv$

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.





PCI-CT 5 BR

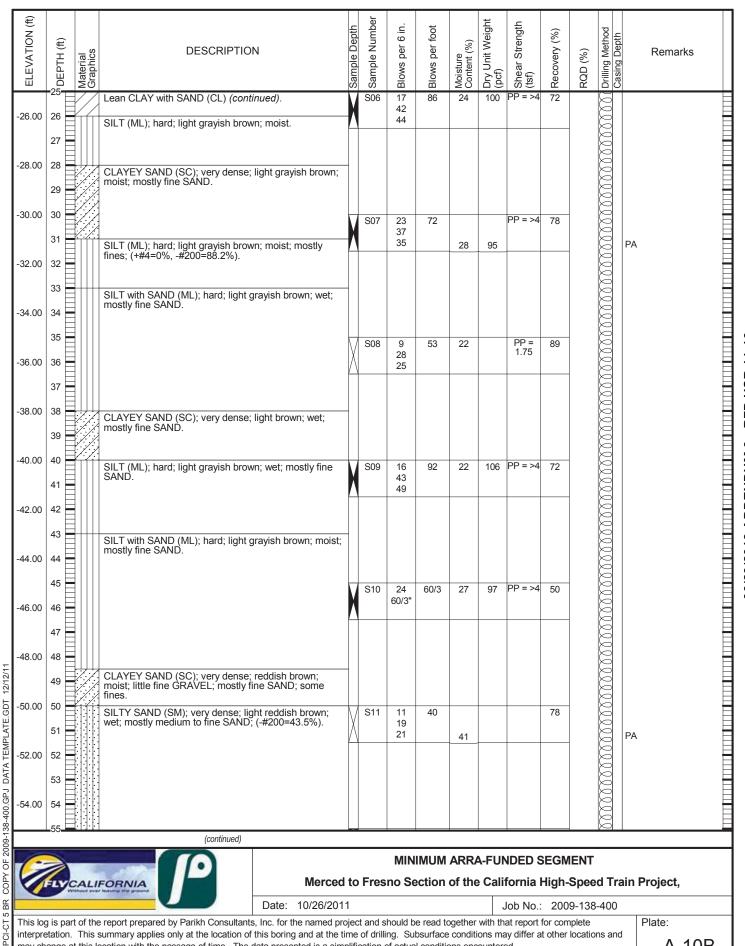
Merced to Fresno Section of the California High-Speed Train Project,

10/26/2011 Date: Job No.: 2009-138-400

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate:

	Bhan		<b>10-28-11 10-28-1</b>					3' 12" Offset, Si	ation. I	ine)					009R ACE ELEVATION
Tech	nnicor	n En	gineering Services, Inc.	ST	A 185	8+50	11011 (0	711301, 0	ation, L					0.0	ft
	NG ME				L RIG <b>IE 55</b>									BORE <b>8 in</b>	HOLE DIAMETER
			AND SIZE(S) (ID) - SPT (1.4" I.D.)		HAMM <b>Ibs</b>	ER TYP	Έ						1	HAMN <b>87</b> %	MER EFFICIENCY, ER
	HOLE BA		ILL AND COMPLETION T		UNDW DINGS	ATER	DURIN	IG DRIL	LING		DRILLIN				L DEPTH OF BORING
ELEVATION (ft)	Р DЕРТН (ft)	Material Graphics	DESCRIPTIO		Some Donth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method	Remarks
	1		SILTY SAND (SM); dense; reddis mostly fine SAND; moderate cem-	h brown; moist; entation.										{	
-2.00	3		(+#4=0%, -#200=19.9%).			S01	7 19 27	46	3	114		78			PA PA
4.00	4		Trace fine GRAVEL; (+#4=4.3%,	-#200=24.5%).										)}	R, PA, CP (Bulk 2'-5
6.00	5 6		Medium dense; little fine GRAVEL			S02	4 6	12	7			72		1000	l
-8.00	7 8				/		6							222222	CR
10.00	9 10 11		Medium dense; light reddish brow	n.		S03	5 6 5	11	8			44			
12.00	12				<u>/</u>	V	3							0000000	
14.00	14		Well-graded SAND with SILT (SW	V-SM): loose: liah	t	/ S04	2	7				56		MMM	
16.00	16		reddish brown; moist; mostly fine -#200=11.2%).	SAND; (+#4=3.59	%, <u>\</u>		3 4		10					MMM	PA
18.00	17 18													200000	
20.00	20 =		Dense; light grayish brown; mostly SAND.	y medium to fine		S05	7 17 14	31	12			67		22222	
22.00	22 =		Loop CLAV with SAND (OL)	l: light growing b	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \									MANN	
24.00	24		Lean CLAY with SAND (CL); hard moist; some fine SAND; low to m fines.	i, light grayish bro ledium plasticity	wri;										
			(continued)	ı											
	Tivo	ALI	FORNIA	Mer	ced t	o Fres					IDED S			ed Tr	rain Project,
_				Date: 10/26	2011					J	ob No.:	200	9-138	3-400	1
			e report prepared by Parikh Consultant summary applies only at the location of	s, Inc. for the name	ed proje					with the	at report	for com	plete		Plate:



This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Date:

Plate:

A-10B

-56.00   56	emarks		Drilling Method	RQD (%)	Recovery (%)	Shear Strength (tsf)	Dry Unit Weight (pcf)	Moisture Content (%)	Blows per foot	Blows per 6 in.	Sample Number	Sample Depth	DESCRIPTION	Material Graphics	DEPTH (ft)	ELEVATION (ft)
-80.00			0000		83				71	37	S12	X	SILTY SAND (SM) (continued). SILTY SAND (SM); very dense; light reddish brown; wet; mostly medium to fine SAND; (-#200=43.5%). layer description continued from previous page			-56.00
-60.00 60			2000													-58.00
-62.00 62			200		78			12	30	14	S13	M	Dense; light grayish brown; mostly fine SAND.	∃:  :		-60.00
-64.00 64			200							10		/ \			62	-62.00
-66.00 66			200												64	-64.00
-68.00 68			200		89			16	38	18	S14		Very dense.		66	-66.00
-70.00 70			11111													-68.00
71			00000		83			18	62		S15	V	Very dense; reddish brown.			-70.00
-74.00 74			200									Δ				-72.00
75 Olive brown; mostly medium to fine SAND.  S16 52 60/4 15 107 56  77			2000													-74.00
77 =   ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;		DS	2000		56		107	15	60/4		S16	X	Olive brown; mostly medium to fine SAND.			-76.00
79			11111													
81			0000		78				48		S17	$\frac{1}{\sqrt{2}}$	SILT (ML); hard; light grayish brown; wet; mostly fines;			-80.00
82.00 82 =		PA	2000					29		18		X	(+#4=0%, -#200=93.3%).			-82.00
83 -84.00 84 -			00000													-84.00
(continued)  MINIMUM ARRA-FUNDED SEGMENT			20									<u> </u>	(continued)		85_	

PCI-CT 5 BR COPY OF 2009-138-400.GPJ DATA TEMPLATE.GDT 12/12/11

CALIFORNIA

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Date: 10/26/2011

Plate:

Merced to Fresno Section of the California High-Speed Train Project,

Job No.: 2009-138-400

A-10C

ELEVATION (ft)	DEPTH (ft)	Material	Graphics	DESCRIPTIO	N	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method	Remarks
-86.00	86 87			CLAYEY SAND (SC); very dense; wet; little fine GRAVEL; mostly me (+#4=14.6%, -#200=36.3%). layer continued from previous page	light grayish brown; dium to fine SAND; description	X	S18	34 50/6"	50/6	25			61		DODDOD	PA
-88.00	88			SANDY lean CLAY (CL): hard: link	nt gravish hrown:											
-90.00	90			SANDY lean CLAY (CL); hard; light wet; little fine GRAVEL; some fine medium plasticity fines.	SAND; low to	17	S19	33	60/5	28		PP =	56		0000	
-92.00	91 92 93			SILT with SAND (ML); hard; light of mostly fine SAND.	rayish brown; wet;	1		60/5"				1.5			22222222222222	
-94.00															STATEST	
-96.00	95 96			SANDY SILT (ML); hard; light gray some fine SAND; mostly fines; (+#, -#200=64.1%).	vish brown; wet; 4=0%,	X	S20	38 60/6"	60/6	25	88		61		20000	PA
-98.00	97 98 99			SILTY SAND (SM); very dense; lig wet; mostly medium to fine SAND	ht grayish brown;										000000000000000000000000000000000000000	
100.00	100			Mostly fine SAND.		X	S21	16 24 27	51	17			72	_	DODDODD	
102.00 104.00	103														DISTITUTE	
106.00	105 106														RRRRRRR	
108.00	107 108 109														DODDO	
110.00				Medium dense; light gray; wet; mo SAND.	stly coarse to fine		S23	8 9 9	18	74			72		222222	
112.00	112 113			Boring terminated at planned dept Bottom of borehole at 111.5 ft bgs	n.						'					
114.00	114															
6			10									DED S				
	FLY	CA	LIF	FORNIA Meaning title ground			Fres	no Se	ection	of the						ain Project,
					Date: 10/26/201	1					1.1	ob No.:	200	9-138	3-400	



	BY hangoo			9' 9	" / -1	19° 53	' 36"			nd Datur	n)			ID 010A ACE ELEVATION
Techni RILLING		ngineering Services, Inc.	STA DRILL F	1834 RIG								E		HOLE DIAMETER
VIC (2.	.5" I.D.)	) AND SIZE(S) (ID) - SPT (1.4" I.D.) FILL AND COMPLETION	SPT HA 140 II	bs			G DRILI	ING	AFTER	DRILLIN	NG (DA		87%	MER EFFICIENCY, ERI
	CEMEN	IT	READIN	IGS					on 10	-31-20 <sup>-</sup>			31.5	5 ft
ELEVATION (ft)	DEPTH (ft) Material Graphics	DESCRIPTION -		Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Recovery (%)	RQD (%)	Drilling Method	Remarks
1	1	SILTY SAND (SM); very dense; red mostly fine SAND; moderate cemen	dish brown; moist; itation.		S01	5	79/9				78		<b>}</b>	
3	3	(+#4=0%, -#200=27.3%).		X		29 50/3"	. 0.0							PA, CL
5	5	(+#4=1.3%, -#200=31.7%).  Medium dense.		X	S02	10 5 6	11	4			100		\{\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	R, CP, PA (Bulk 2'-5') PA
7 8 9	8	Poorly graded SAND with SILT (SP	SM) madi		S03	3	14				89			
12	1 2 3 4 4	dense; reddish brown; moist; trace f mostly fine SAND; few fines; (+#4=4-#200=8.0%).	ine GRAVFI	<u>X</u>	303	8 6	14	3			69			PA
16	5   11   1   1   1   1   1   1   1   1	Poorly graded SAND (SP); medium brown; moist; mostly coarse to med	dense; light ium SAND.	X	S04	3 7 9	16	3	98		100		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	DS
20	20	Poorly graded SAND with SILT (SP-dense; yellowish brown; mostly fine	-SM); medium SAND.	X	S05	5 7 5	12	2			100			
24	24	(continued)											}	
	NYCALI WHIRESE PER	IFORNIA or Meaning the crossed	Merce	d to	Fre					IDED S			d Tr	ain Project,
erpretat	ition. This	ne report prepared by Parikh Consultants, summary applies only at the location of the location with the passage of time. The date	nis boring and at the	orojeo time	of dri	lling. Su	bsurface	condit	with the	y differ a	for com	plete		Plate:

ELEVATION (ft)	(#) HEDED 25	Material	DESCRIPTIO	P-SM): medium	Sample Depth	Sample Number	A Blows per 6 in.	99 Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	& Recovery (%)	RQD (%)	Casing Depth		Remarks	
	26 27 28 29 30		Poorly graded SAND with SILT (S dense; yellowish brown; mostly fin description continued from previc Dense; trace fine GRAVEL; (+#4= Poorly graded SAND with SILT (S	le SAND. layer bus page 3.5%, #200=5.2%). P-SM) (continued).	X_		12 14		2	138					PA		
	31 32 33 34		Very dense; little fine GRAVEL.  Boring terminated at planned dept Bottom of borehole at 31.5 ft bgs.	th.	<u>X</u>	S07	34 50/3"	50/3	8	111		50					
	35 36 37 38																
	39 40 41 42 43																
	44 45 46 47																
MPLAIE.GDI 12/12/11	48 49 50 51																
2009-138-400.GFJ DATA IEMPLAIE.GDI 12/12/11	52 53 54 55																
COPY OF 200	7.	CAL	IFORNIA ner learning the ground	Merced	to I	Fres					DED S			ed Tra	in P	roject,	

Date: 10/26/2011

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete

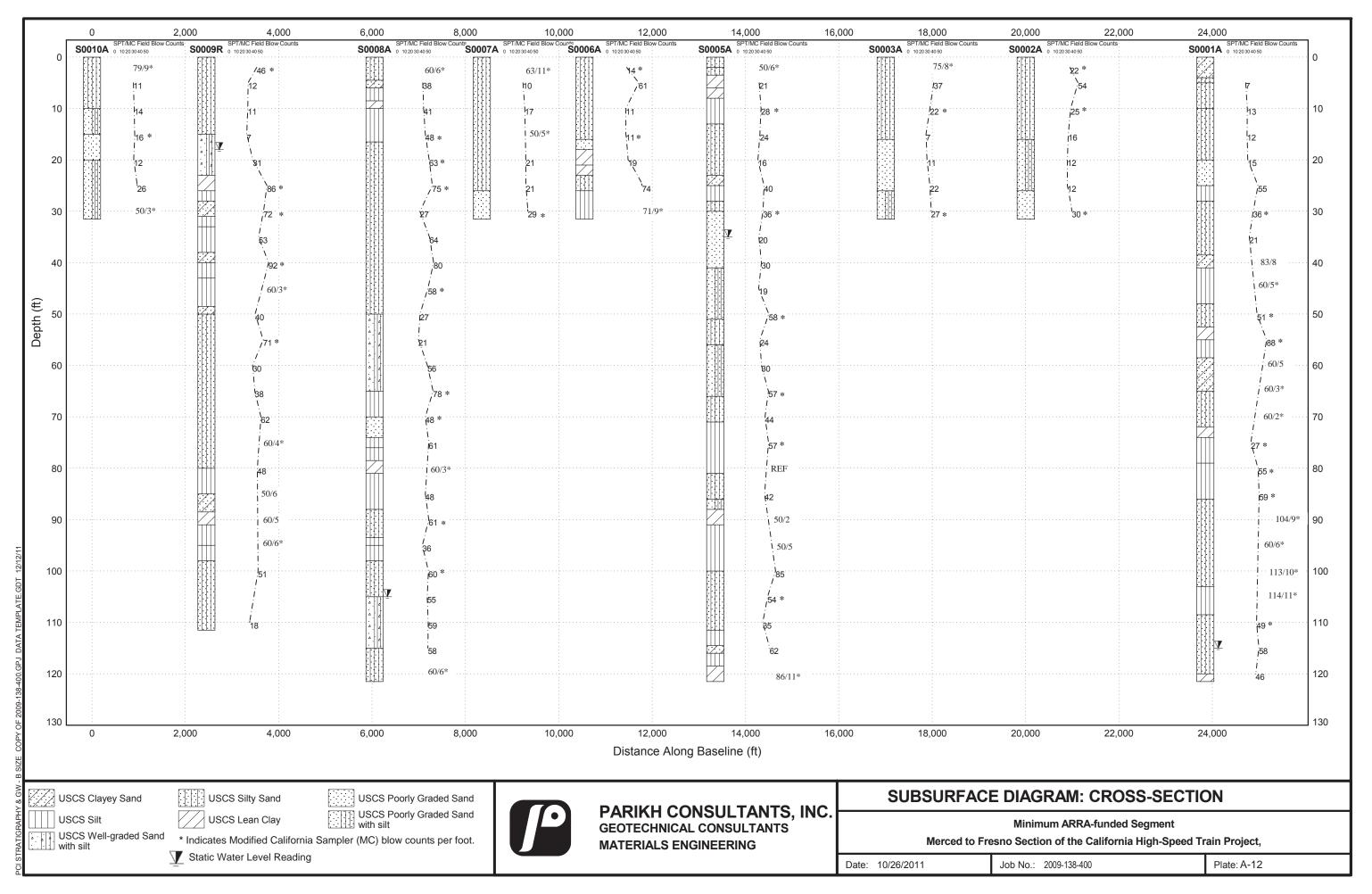
interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Job No.: 2009-138-400

Plate:

<u>A-11B</u>

PCI-CT 5 BR COPY OF 20





#### GREGG DRILLING & TESTING, INC.

GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION SERVICES

October 28, 2011

Parikh Consultants Attn: Frank Li

Subject: CPT Site Investigation

California High Speed Rail

, California

GREGG Project Number: 11-632SH

Dear Mr. Li:

The following report presents the results of GREGG Drilling & Testing's Cone Penetration Test investigation for the above referenced site. The following testing services were performed:

1	Cone Penetration Tests	(CPTU)	
2	Pore Pressure Dissipation Tests	(PPD)	
3	Seismic Cone Penetration Tests	(SCPTU)	
4	UVOST Laser Induced Fluorescence	(UVOST)	
5	Groundwater Sampling	(GWS)	
6	Soil Sampling	(SS)	11/2
7	Vapor Sampling	(VS)	
8	Pressuremeter Testing	(PMT)	
9	Vane Shear Testing	(VST)	
10	Dilatometer Testing	(DMT)	

A list of reference papers providing additional background on the specific tests conducted is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact our office at (562) 427-6899.

Sincerely,

Peter Robertson

Technical Director, Gregg Drilling & Testing, Inc.



### GREGG DRILLING & TESTING, INC. GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION SERVICES

#### Cone Penetration Test Sounding Summary

-Table 1-

CPT Sounding Identification	Date	Termination Depth (Feet)	Depth of Groundwater Samples (Feet)	Depth of Soil Samples (Feet)	Depth of Pore Pressure Dissipation Tests (Feet)
SCPT-4	10/27/11	76	-	-	71.0



#### GREGG DRILLING & TESTING, INC.

#### GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION SERVICES

#### **Bibliography**

Lunne, T., Robertson, P.K. and Powell, J.J.M., "Cone Penetration Testing in Geotechnical Practice" E & FN Spon. ISBN 0 419 23750, 1997

Roberston, P.K., "Soil Classification using the Cone Penetration Test", Canadian Geotechnical Journal, Vol. 27, 1990 pp. 151-158.

Mayne, P.W., "NHI (2002) Manual on Subsurface Investigations: Geotechnical Site Characterization", available through <a href="https://www.ce.gatech.edu/~geosys/Faculty/Mayne/papers/index.html">www.ce.gatech.edu/~geosys/Faculty/Mayne/papers/index.html</a>, Section 5.3, pp. 107-112.

Robertson, P.K., R.G. Campanella, D. Gillespie and A. Rice, "Seismic CPT to Measure In-Situ Shear Wave Velocity", Journal of Geotechnical Engineering ASCE, Vol. 112, No. 8, 1986 pp. 791-803.

Robertson, P.K., Sully, J., Woeller, D.J., Lunne, T., Powell, J.J.M., and Gillespie, D.J., "Guidelines for Estimating Consolidation Parameters in Soils from Piezocone Tests", Canadian Geotechnical Journal, Vol. 29, No. 4, August 1992, pp. 539-550.

Robertson, P.K., T. Lunne and J.J.M. Powell, "Geo-Environmental Application of Penetration Testing", Geotechnical Site Characterization, Robertson & Mayne (editors), 1998 Balkema, Rotterdam, ISBN 9054109394 pp 35-47.

Campanella, R.G. and I. Weemees, "Development and Use of An Electrical Resistivity Cone for Groundwater Contamination Studies", Canadian Geotechnical Journal, Vol. 27 No. 5, 1990 pp. 557-567.

DeGroot, D.J. and A.J. Lutenegger, "Reliability of Soil Gas Sampling and Characterization Techniques", International Site Characterization Conference - Atlanta, 1998.

Woeller, D.J., P.K. Robertson, T.J. Boyd and Dave Thomas, "Detection of Polyaromatic Hydrocarbon Contaminants Using the UVIF-CPT", 53<sup>rd</sup> Canadian Geotechnical Conference Montreal, QC October pp. 733-739, 2000.

Zemo, D.A., T.A. Delfino, J.D. Gallinatti, V.A. Baker and L.R. Hilpert, "Field Comparison of Analytical Results from Discrete-Depth Groundwater Samplers" BAT EnviroProbe and QED HydroPunch, Sixth national Outdoor Action Conference, Las Vegas, Nevada Proceedings, 1992, pp 299-312.

Copies of ASTM Standards are available through www.astm.org



Avg. Interval: 0.328 (ft)

## **PARIKH CONSULTANTS**

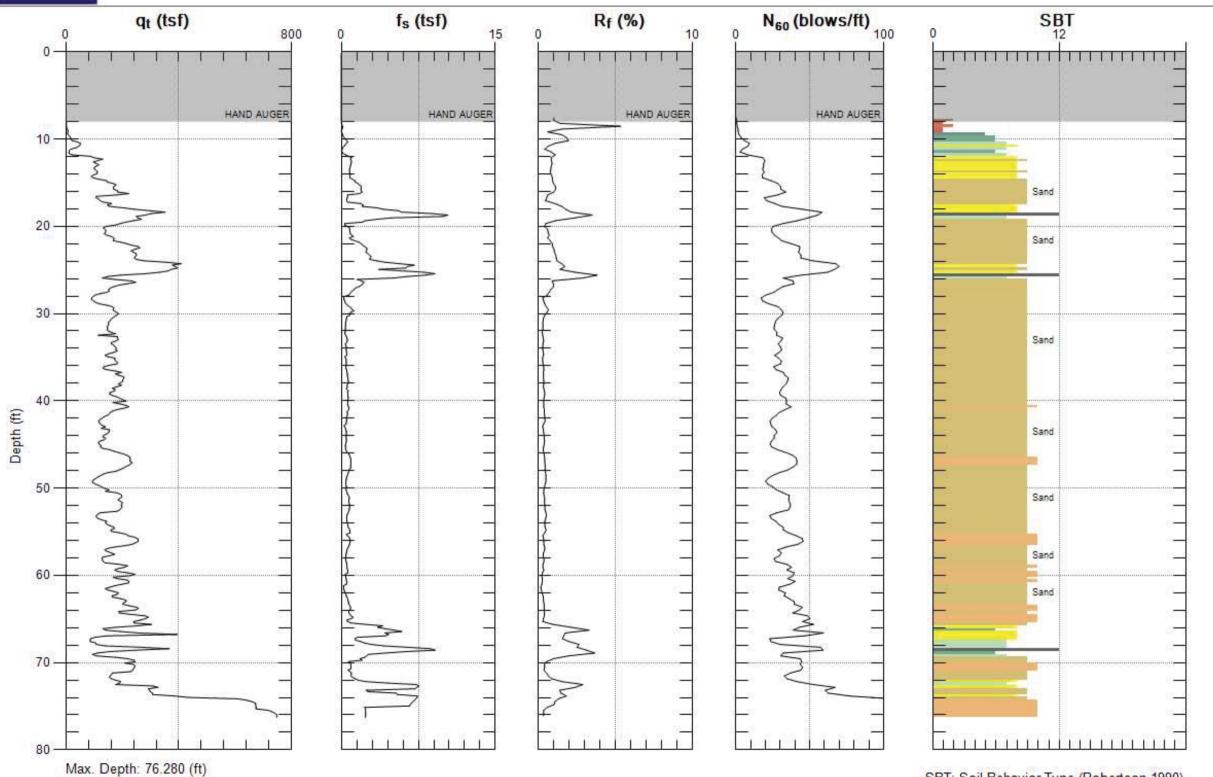
Site: CHSR

Sounding: SCPT-4

Engineer: F.LI

Date: 10/27/2011 01:55

SBT: Soil Behavior Type (Robertson 1990)





Avg. Interval: 0.328 (ft)

## **PARIKH CONSULTANTS**

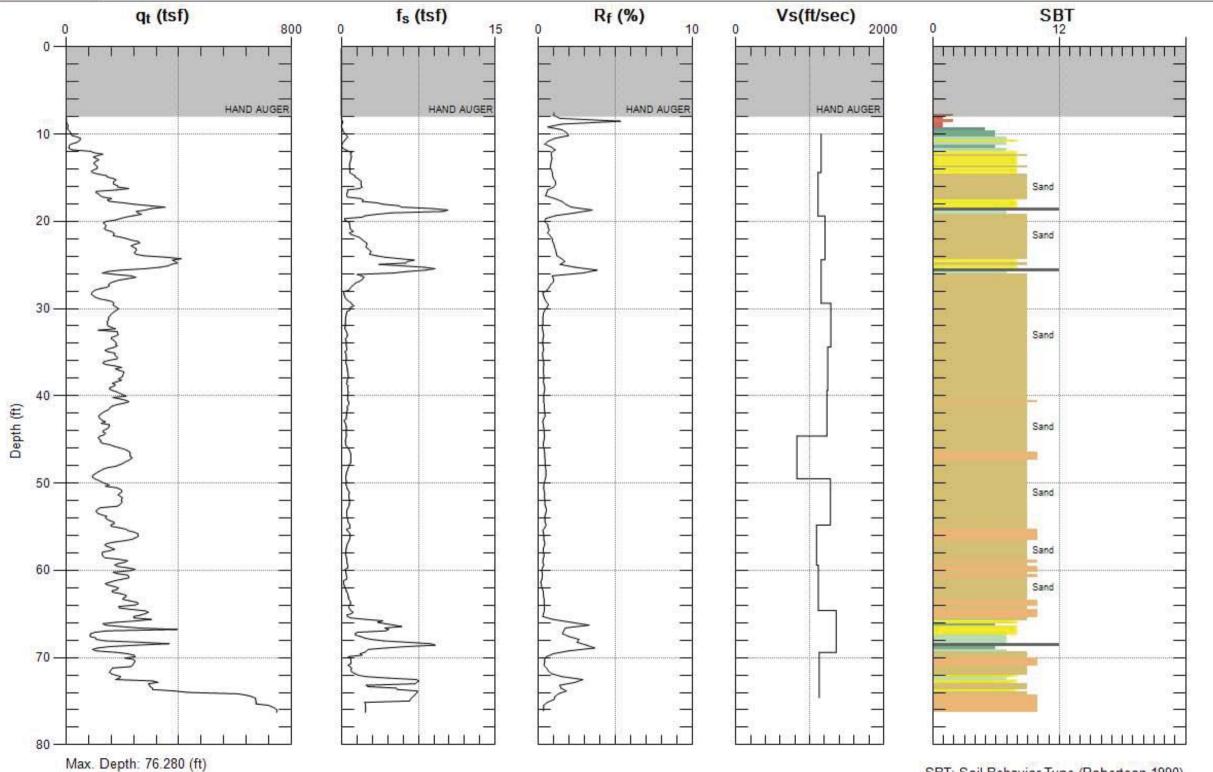
Site: CHSR

Sounding: SCPT-4

Engineer: F.LI

Date: 10/27/2011 01:55

SBT: Soil Behavior Type (Robertson 1990)





Avg. Interval: 0.328 (ft)

## **PARIKH CONSULTANTS**

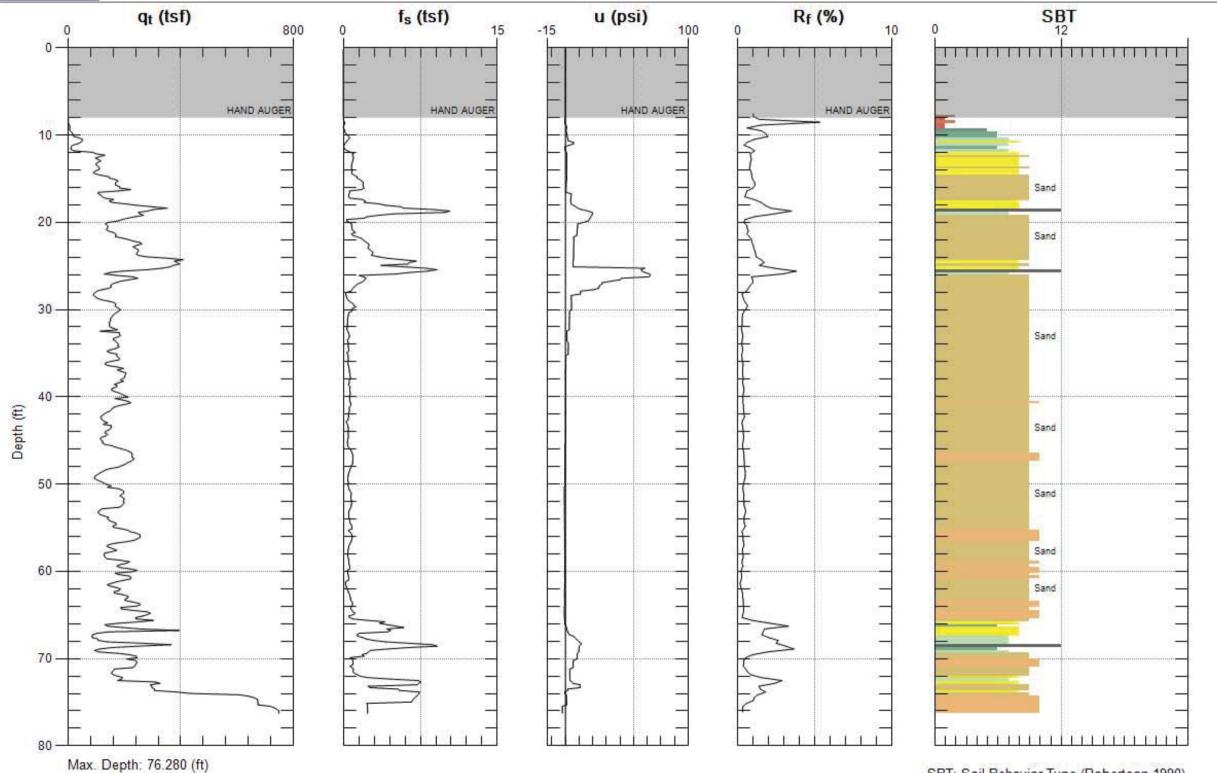
Site: CHSR

Sounding: SCPT-4

Engineer: F.LI

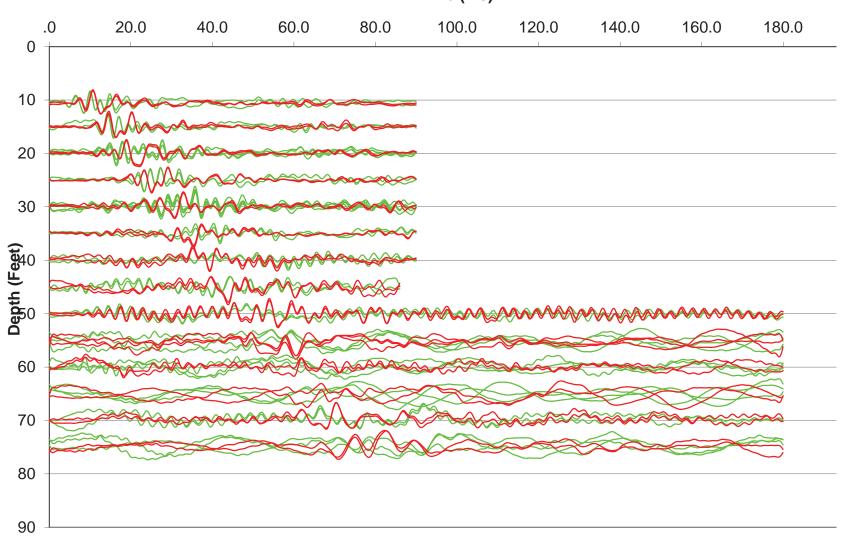
Date: 10/27/2011 01:55

SBT: Soil Behavior Type (Robertson 1990)





## Waveforms for Sounding SCPT-4 Time (ms)







# Shear Wave Velocity Calculations CHSR SCPT-4

Geophone Offset: 0.66 Feet Source Offset:

1.67 Feet 10/27/11

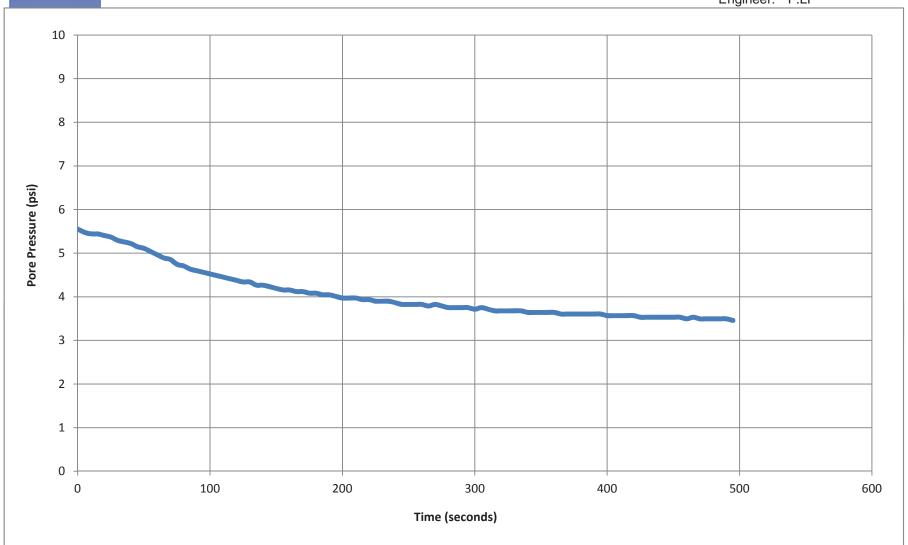
Test Depth (Feet)	Geophone Depth (Feet)	Waveform Ray Path (Feet)	Incremental Distance (Feet)	Characteristic Arrival Time (ms)	Incremental Time Interval (ms)	Interval Velocity (Ft/Sec)	Interval Depth (Feet)
10.66	10.00	10.14	10.14	10.7000			
15.09	14.43	14.53	4.39	14.5000	3.8000	1154.5	12.22
20.01	19.35	19.42	4.90	18.9000	4.4000	1112.9	16.89
25.10	24.44	24.50	5.07	23.1000	4.2000	1207.2	21.90
30.02	29.36	29.41	4.91	27.3500	4.2500	1155.7	26.90
35.10	34.44	34.49	5.08	31.3000	3.9500	1285.6	31.90
40.03	39.37	39.40	4.92	35.2500	3.9500	1244.6	36.91
45.28	44.62	44.65	5.25	39.5000	4.2500	1234.2	41.99
50.20	49.54	49.56	4.92	45.4500	5.9500	826.6	47.08
55.45	54.79	54.81	5.25	49.5500	4.1000	1279.7	52.16
60.04	59.38	59.40	4.59	53.7500	4.2000	1093.1	57.08
65.29	64.63	64.65	5.25	58.4500	4.7000	1116.5	62.00
70.05	69.39	69.41	4.76	61.9500	3.5000	1358.8	67.01
75.30	74.64	74.65	5.25	66.6000	4.6500	1128.6	72.01



#### **GREGG DRILLING & TESTING**

**Pore Pressure Dissipation Test** 

Sounding: SCPT-4
Depth: 71.03 ft
Site: CHSR
Engineer: F.LI





## Cone Penetration Testing Procedure (CPT)

Gregg Drilling carries out all Cone Penetration Tests (CPT) using an integrated electronic cone system, *Figure CPT*. The soundings were conducted using a 20 ton capacity cone with a tip area of 15 cm<sup>2</sup> and a friction sleeve area of 225 cm<sup>2</sup>. The cone is designed with an equal end area friction sleeve and a tip end area ratio of 0.80.

The cone takes measurements of cone bearing  $(q_c)$ , sleeve friction  $(f_s)$  and penetration pore water pressure  $(u_2)$  at 5cm intervals during penetration to provide a nearly continuous log. CPT data reduction and interpretation is performed in real time facilitating on-site decision The making. above mentioned parameters are stored on disk for further analysis and reference. ΑII soundings are performed in accordance with revised (2007) ASTM standards (D 5778-07).

The cone also contains a porous filter element located directly behind the cone tip  $(u_2)$ . It consists of porous plastic and is 5.0mm thick. The filter element is used to obtain penetration pore pressure as the cone is advanced as well as Pore Pressure Dissipation Tests (*PPDT's*) during appropriate pauses in penetration. It should be noted that prior to penetration, the element is fully saturated with oil under vacuum pressure to ensure accurate and fast dissipation.

The cone has the following accuracy: 1 tsf for  $q_c$ , 0.02 tsf for  $f_s$  and 0.5 psi for  $u_2$ . In soft clays, a lower capacity cone should be used for improved accuracy.

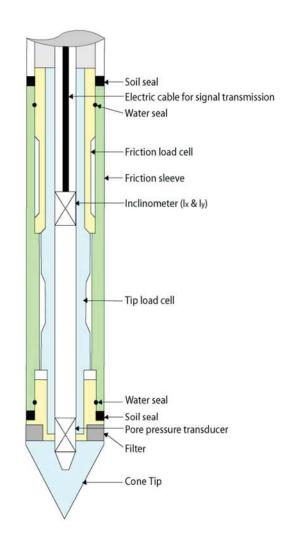


Figure CPT

When the soundings are complete, the test holes are grouted. The grouting procedures generally consist of pushing a hollow tremie pipe with a "knock out" plug to the termination depth of the CPT hole. Grout is then pumped under pressure as the tremie pipe is pulled from the hole. Disruption or further contamination to the site is therefore minimized.



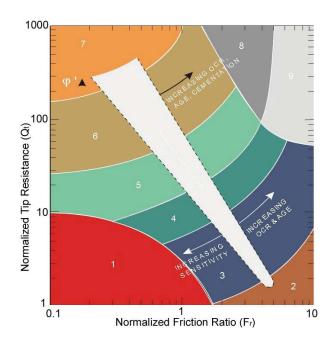
### **Cone Penetration Test Data & Interpretation**

The Cone Penetration Test (CPT) data collected from your site are presented in graphical form in the attached report. The plots include interpreted Soil Behavior Type (SBT) based on the charts described by Robertson (1990). Typical plots display SBT based on the non-normalized charts of Robertson et al (1986). For CPT soundings extending greater than 50 feet, we recommend the use of the normalized charts of Robertson (1990) which can be displayed as SBTn, upon request. The report also includes spreadsheet output of computer calculations of basic interpretation in terms of SBT and SBTn and various geotechnical parameters using current published correlations based on the comprehensive review by Lunne, Robertson and Powell (1997), as well as recent updates by Professor Robertson. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed. Gregg Drilling & Testing Inc. do not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the software and do not assume any liability for any use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used in the software.

Some interpretation methods require input of the groundwater level to calculate vertical effective stress. An estimate of the in-situ groundwater level has been made based on the field observations and/or CPT results, but should be verified by the user.

A summary of locations and depths is available in Table 1. Note that all penetration depths referenced in the data are with respect to the existing ground surface.

Note that it is not always possible to clearly identify a soil type based solely on  $q_t$ ,  $f_s$ , and  $u_2$ . In these situations, experience, judgment, and an assessment of the pore pressure dissipation data should be used to infer the correct soil behavior type.



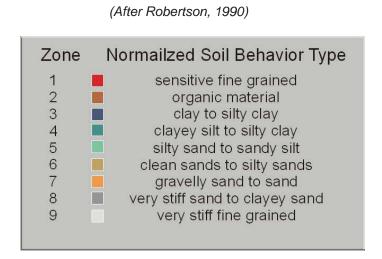


Figure SBTn



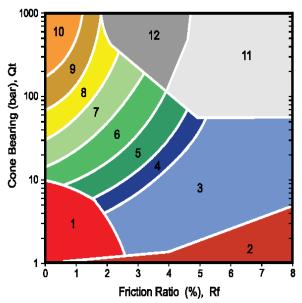
### **Cone Penetration Test Data & Interpretation**

The Cone Penetration Test (CPT) data collected from your site are presented in graphical form in the attached report. The plots include interpreted Soil Behavior Type (SBT) based on the charts described by Robertson (1990). Typical plots display SBT based on the non-normalized charts of Robertson et al (1986). For CPT soundings extending greater than 50 feet, we recommend the use of the normalized charts of Robertson (1990) which can be displayed as SBTn, upon request. The report also includes spreadsheet output of computer calculations of basic interpretation in terms of SBT and SBTn and various geotechnical parameters using current published correlations based on the comprehensive review by Lunne, Robertson and Powell (1997), as well as recent updates by Professor Robertson. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed. Gregg Drilling & Testing Inc. do not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the software and do not assume any liability for any use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used in the software.

Some interpretation methods require input of the groundwater level to calculate vertical effective stress. An estimate of the in-situ groundwater level has been made based on field observations and/or CPT results, but should be verified by the user.

A summary of locations and depths is available in Table 1. Note that all penetration depths referenced in the data are with respect to the existing ground surface.

Note that it is not always possible to clearly identify a soil type based solely on  $q_t$ ,  $f_s$ , and  $u_2$ . In these situations, experience, judgment, and an assessment of the pore pressure dissipation data should be used to infer the correct soil behavior type.



(After Robertson, et al., 1986)

ZONE		SBT					
1		Sensitive, fine grained					
2		Organic materials Clay					
3							
4		Silty clay to clay					
5		Clayey silt to silty clay					
6		Sandy silt to clayey silt					
7		Silty sand to sandy silt					
8		Sand to silty sand					
9		Sand					
10		Gravely sand to sand					
11		Very stiff fine grained*					
12		Sand to clayey sand*					

\*over consolidated or cemented

Figure SBT



#### **Cone Penetration Test (CPT) Interpretation**

Gregg has recently updated their CPT interpretation and plotting software (2007). The software takes the CPT data and performs basic interpretation in terms of soil behavior type (SBT) and various geotechnical parameters using current published empirical correlations based on the comprehensive review by Lunne, Robertson and Powell (1997). The interpretation is presented in tabular format using MS Excel. The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed. Gregg does not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the software and does not assume any liability for any use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used in the software.

The following provides a summary of the methods used for the interpretation. Many of the empirical correlations to estimate geotechnical parameters have constants that have a range of values depending on soil type, geologic origin and other factors. The software uses 'default' values that have been selected to provide, in general, conservatively low estimates of the various geotechnical parameters.

#### **Input:**

- 1 Units for display (Imperial or metric) (atm. pressure, pa = 0.96 tsf or 0.1 MPa)
- Depth interval to average results, (ft or m). Data are collected at either 0.02 or 0.05m and can be averaged every 1, 3 or 5 intervals.
- 3 Elevation of ground surface (ft or m)
- Depth to water table,  $z_w$  (ft or m) input required
- 5 Net area ratio for cone, a (default to 0.80)
- 6 Relative Density constant, C<sub>Dr</sub> (default to 350)
- Young's modulus number for sands,  $\alpha$  (default to 5)
- 8 Small strain shear modulus number
  - a. for sands, S<sub>G</sub> (default to 180 for SBT<sub>n</sub> 5, 6, 7)
  - b. for clays,  $C_G$  (default to 50 for  $SBT_n 1, 2, 3 & 4)$
- 9 Undrained shear strength cone factor for clays,  $N_{kt}$  (default to 15)
- Over Consolidation ratio number,  $k_{ocr}$  (default to 0.3)
- Unit weight of water, (default to  $\gamma_w = 62.4 \text{ lb/ft}^3 \text{ or } 9.81 \text{ kN/m}^3$ )

#### Column

- 1 Depth, z, (m) CPT data is collected in meters
- 2 Depth (ft)
- 3 Cone resistance,  $q_c$  (tsf or MPa)
- 4 Sleeve friction, f<sub>s</sub> (tsf or MPa)
- 5 Penetration pore pressure, u (psi or MPa), measured behind the cone (i.e. u<sub>2</sub>)
- 6 Other any additional data, if collected, e.g. electrical resistivity or UVIF
- 7 Total cone resistance,  $q_t$  (tsf or MPa)  $q_t = q_c + u (1-a)$

8	Friction Ratio, $R_f$ (%)	$R_f = (f_s/q_t) \times 100\%$
9	Soil Behavior Type (non-normalized), SBT	see note
10	Unit weight, $\gamma$ (pcf or kN/m <sup>3</sup> )	based on SBT, see note
11	Total overburden stress, $\sigma_v$ (tsf)	$\sigma_{vo} = \gamma z$
12	Insitu pore pressure, u <sub>o</sub> (tsf)	$u_o = \gamma_w (z - z_w)$
13	Effective overburden stress, $\sigma'_{vo}$ (tsf)	$\sigma'_{vo} = \sigma_{vo}$ - $u_o$
14	Normalized cone resistance, Qt1	$Q_{t1} = (q_t - \sigma_{vo}) / \sigma'_{vo}$
15	Normalized friction ratio, F <sub>r</sub> (%)	$F_r = f_s / (q_t - \sigma_{vo}) \times 100\%$
16	Normalized Pore Pressure ratio, B <sub>q</sub>	$B_{q} = u - u_{o} / (q_{t} - \sigma_{vo})$
17	Soil Behavior Type (normalized), SBT <sub>n</sub>	see note
18	$SBT_n$ Index, $I_c$	see note
19	Normalized Cone resistance, Q <sub>tn</sub> (n varies with	Ic) see note
20	Estimated permeability, k <sub>SBT</sub> (cm/sec or ft/sec)	see note
21	Equivalent SPT N <sub>60</sub> , blows/ft	see note
22	Equivalent SPT (N <sub>1</sub> ) <sub>60</sub> blows/ft	see note
23	Estimated Relative Density, D <sub>r</sub> , (%)	see note
24	Estimated Friction Angle, φ', (degrees)	see note
25	Estimated Young's modulus, E <sub>s</sub> (tsf)	see note
26	Estimated small strain Shear modulus, Go (tsf)	see note
27	Estimated Undrained shear strength, s <sub>u</sub> (tsf)	see note
28	Estimated Undrained strength ratio	$s_u/\sigma_v$
29	Estimated Over Consolidation ratio, OCR	see note

#### **Notes:**

- Soil Behavior Type (non-normalized), SBT Lunne et al. (1997) listed below
- Unit weight,  $\gamma$  either constant at 119 pcf or based on Non-normalized SBT (Lunne et al., 1997 and table below)
- 3 Soil Behavior Type (Normalized), SBT<sub>n</sub> Lunne et al. (1997)
- 4 SBT<sub>n</sub> Index,  $I_c = ((3.47 \log Q_{t1})^2 + (\log F_r + 1.22)^2)^{0.5}$
- 5 Normalized Cone resistance, Q<sub>tn</sub> (n varies with Ic)

 $Q_{\text{tn}}$  = ((q\_t -  $\sigma_{vo})$ /pa) (pa/( $\sigma'_{vo})^n$  and recalculate  $I_c,$  then iterate:

When  $I_c < 1.64$ , n = 0.5 (clean sand)

When  $I_c > 3.30$ , n = 1.0 (clays)

When  $1.64 < I_c < 3.30$ ,  $n = (I_c - 1.64)0.3 + 0.5$ 

Iterate until the change in n,  $\Delta n < 0.01$ 

- Estimated permeability,  $k_{SBT}$  (based on Normalized SBT<sub>n</sub>) (Lunne et al., 1997 and table below)
- 7 Equivalent SPT N<sub>60</sub>, blows/ft Lunne et al. (1997)

$$\frac{(q_{\text{t}}/p_{\text{a}})}{N_{60}} = 8.5 \left(1 - \frac{I_{\text{c}}}{4.6}\right)$$

- 8 Equivalent SPT  $(N_1)_{60}$  blows/ft  $(N_1)_{60} = N_{60} C_{N}$ , where  $C_N = (pa/\sigma'_{vo})^{0.5}$
- 9 Relative Density,  $D_r$ , (%)  $D_r^2 = Q_{tn} / C_{Dr}$ Only SBT<sub>n</sub> 5, 6, 7 & 8 Show 'N/A' in zones 1, 2, 3, 4 & 9
- 10 Friction Angle,  $\phi'$ , (degrees)  $\tan \phi' = \frac{1}{2.68} \left[ \log \left( \frac{q_c}{\sigma'_{vo}} \right) + 0.29 \right]$ Only  $SBT_n 5$ , 6, 7 & 8 Show'N/A' in zones 1, 2, 3, 4 & 9
- 11 Young's modulus,  $E_s$   $E_s = \alpha q_t$  Show 'N/A' in zones 1, 2, 3, 4 & 9
- 12 Small strain shear modulus, Go
  a.  $G_o = S_G (q_t \ \sigma'_{vo} \ pa)^{1/3}$  For  $SBT_n \ 5, \ 6, \ 7$ b.  $G_o = C_G \ q_t$  For  $SBT_n \ 1, \ 2, \ 3 \& \ 4$ Show 'N/A' in zones 8 & 9
- Undrained shear strength,  $s_u$   $s_u = (q_t \sigma_{vo}) / N_{kt}$   $Only SBT_n 1, 2, 3, 4 & 9$  Show 'N/A' in zones 5, 6, 7 & 8
- Over Consolidation ratio, OCR OCR =  $k_{ocr} Q_{t1}$ Only SBT<sub>n</sub> 1, 2, 3, 4 & 9 Show 'N/A' in zones 5, 6, 7 & 8

#### SBT Zones SBT<sub>n</sub> Zones

The following updated and simplified SBT descriptions have been used in the software:

1	sensitive fine grained	1	sensitive fine grained
2	organic soil	2	organic soil
3	clay	3	clay
4	clay & silty clay	4	clay & silty clay
5	clay & silty clay		
6	sandy silt & clayey silt		
7	silty sand & sandy silt	5	silty sand & sandy silt
8	sand & silty sand	6	sand & silty sand
9	sand		
10	sand	7	sand

11	very dense/stiff soil*	8	very dense/stiff soil*
12	very dense/stiff soil*	9	very dense/stiff soil*

<sup>\*</sup>heavily overconsolidated and/or cemented

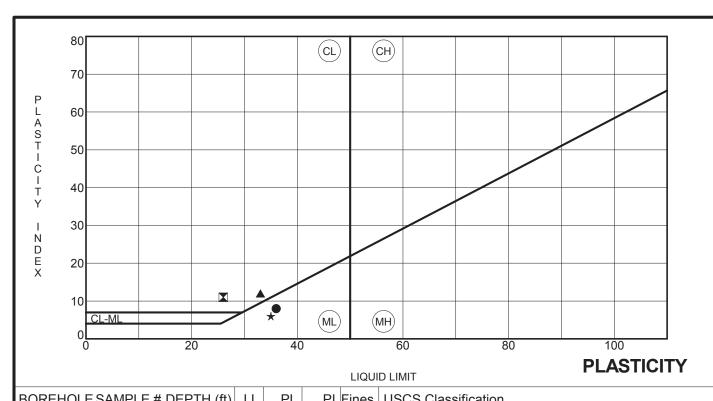
Track when soils fall with zones of same description and print that description (i.e. if soils fall only within SBT zones 4 & 5, print 'clays & silty clays')

#### Estimated Permeability (see Lunne et al., 1997)

$SBT_n \\$	Permeability (ft/sec)	(m/sec)
1	$3x\ 10^{-8}$	1x 10 <sup>-8</sup>
2	$3x\ 10^{-7}$	$1x\ 10^{-7}$
3	$1 \times 10^{-9}$	$3x\ 10^{-10}$
4	$3x\ 10^{-8}$	$1x\ 10^{-8}$
5	$3x\ 10^{-6}$	1x 10 <sup>-6</sup>
6	$3x\ 10^{-4}$	1x 10 <sup>-4</sup>
7	$3x\ 10^{-2}$	$1x\ 10^{-2}$
8	$3x\ 10^{-6}$	$1x\ 10^{-6}$
9	$1 \times 10^{-8}$	$3x \cdot 10^{-9}$

#### Estimated Unit Weight (see Lunne et al., 1997)

SBT	Approximate Unit Weight (lb/ft <sup>3</sup> )	$(kN/m^3)$
1	111.4	17.5
2	79.6	12.5
3	111.4	17.5
4	114.6	18.0
5	114.6	18.0
6	114.6	18.0
7	117.8	18.5
8	120.9	19.0
9	124.1	19.5
10	127.3	20.0
11	130.5	20.5
12	120.9	19.0



BOREHOLE SAMPLE # DEPTH (ft			DEPTH (ft)	LL	PL	PI	Fines	USCS Classification
•	S0001A	S12	56.0	36	28	8		SILT
×	S0005A	S02	6.0	26	15	11		Lean CLAY
A	S0006A	S05	21.0	33	21	12		Lean CLAY
*	S0008A	S03	11.0	35	29	6		SILT

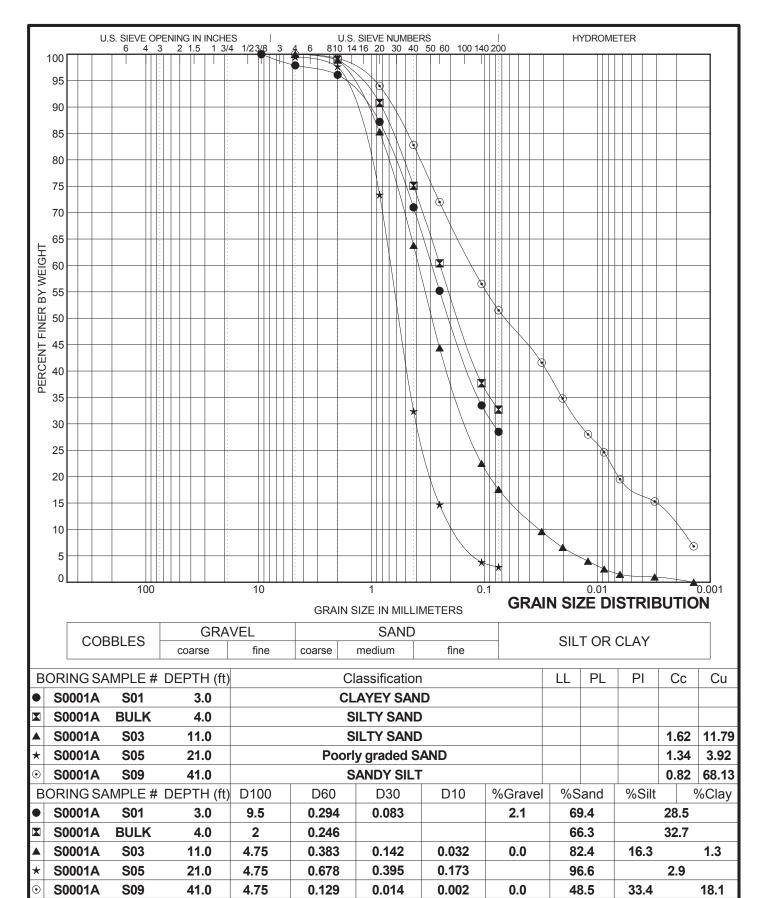


Minimum ARRA-funded Segment

Merced to Fresno Section of the California High-Speed Train Project,

JOB NO:2009-138-400

PLATE NO: B-2





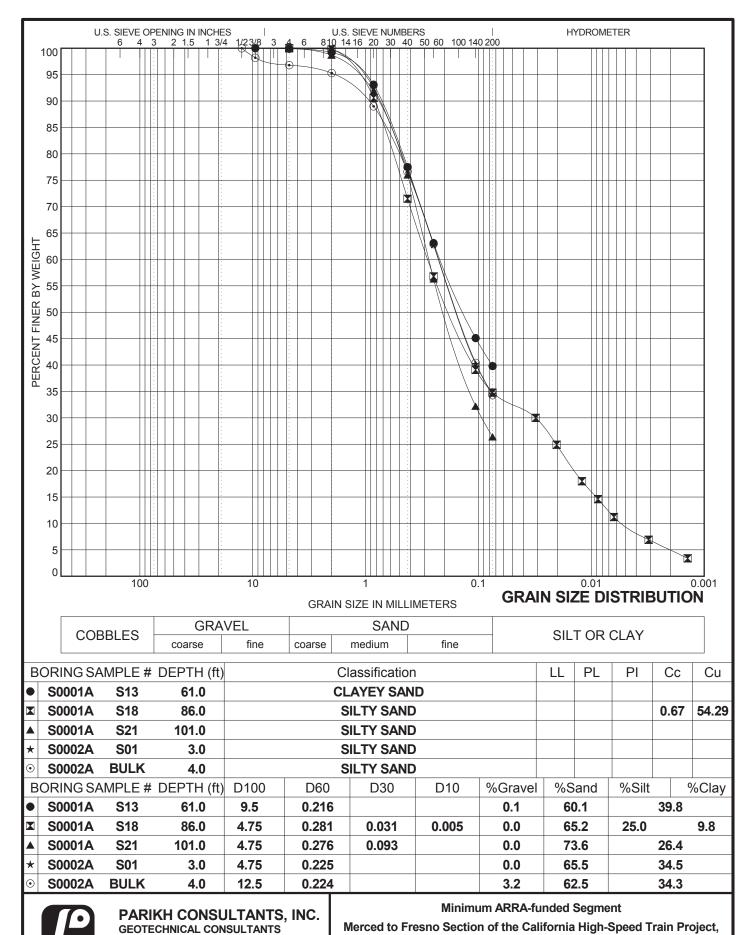
PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS ENGINEERING

Minimum ARRA-funded Segment

Merced to Fresno Section of the California High-Speed Train Project,

JOB NO:2009-138-400

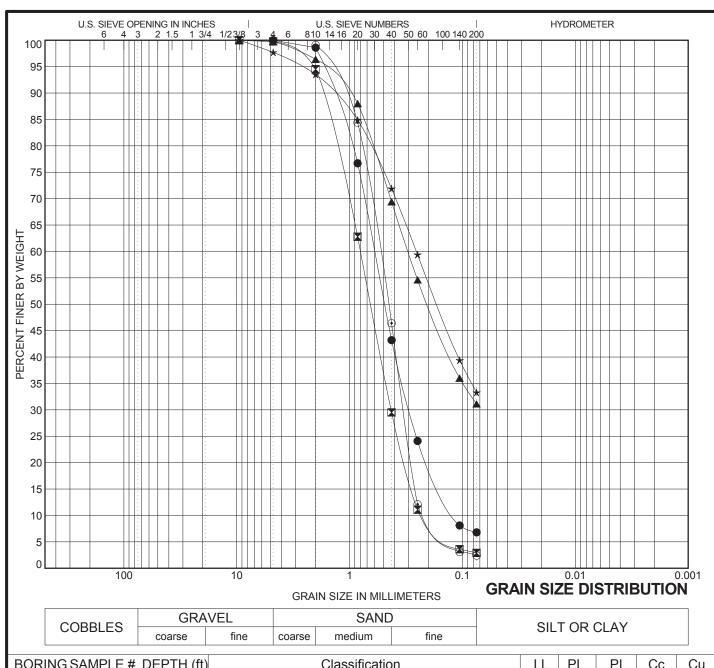
PLATE NO: B-3A



JOB NO:2009-138-400

PLATE NO: B-3B

**MATERIALS ENGINEERING** 



E	BORING SAMPLE # DEPTH (ft) Classification							LL	PL	PI	Сс	Cu	
•	S0002A	S04	16.0		Poorly gra	ded SAND	with SILT					1.23	5.13
×	S0002A	S06	26.0		Poorl	y graded S	AND					1.04	3.64
A	S0003A	S01	3.0		S	ILTY SAND	)						
*	S0003A	BULK	4.0		S	ILTY SAND	)						
•	S0003A	S04	16.0		Poorl	y graded S	AND					0.98	2.66
E	BORING SA	MPLE#	DEPTH (ft)	D100	D60	D30	D10	%Gravel	%S	and	%Silt	9	%Clay
•	S0002A	S04	16.0	4.75	0.602	0.295	0.117	0.0	93	3.2		6.8	
X	S0002A	S06	26.0	9.5	0.802	0.429	0.22	0.2	96	6.9		2.9	
	S0003A	S01	3.0	9.5	0.303			0.3	68.6			31.1	
*	S0003A	BULK	4.0	9.5	9.5 0.256			2.3 64.4		1.4	33.3		
•	S0003A	S04	16.0	2	0.545	0.33	0.205		96	6.7		2.4	



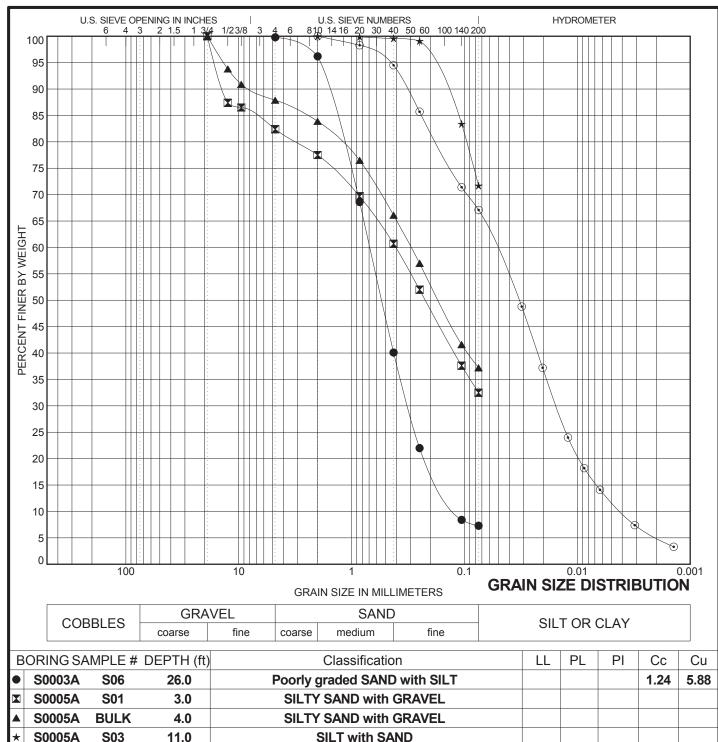
PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS ENGINEERING

Minimum ARRA-funded Segment

Merced to Fresno Section of the California High-Speed Train Project,

**JOB NO:**2009-138-400

PLATE NO: B-3C



В	ORING SA	MPLE #	DEPTH (ft)		Classification					PL	PI	Сс	Cu
•	S0003A	S06	26.0	·	Poorly gra					1.24	5.88		
×	S0005A	S01	3.0		SILTY S	AND with G	RAVEL						
	S0005A	BULK	4.0		SILTY SA	AND with G	RAVEL						
*	S0005A	S03	11.0		SIL								
$\odot$	S0005A	S06	26.0		S	ANDY SILT	•					1.08	13.06
В	ORING SA	MPLE #	DEPTH (ft)	D100	D60	D30	D10	%Gravel	%S	and	%Silt	Q	%Clay
•	S0003A	S06	26.0	4.75	0.69	0.316	0.117		92	2.5		7.3	
×	S0005A	S01	3.0	19	0.407			17.6	49	9.9	32.5		
▲	S0005A	BULK	4.0	19	0.298			12.1	50	0.7		37.2	
*	S0005A	S03	11.0	2				0.0	28	3.3		71.7	
$\odot$	S0005A	S06	26.0	2	0.053	0.015	0.004	0.0	32	2.9	55.2		11.9



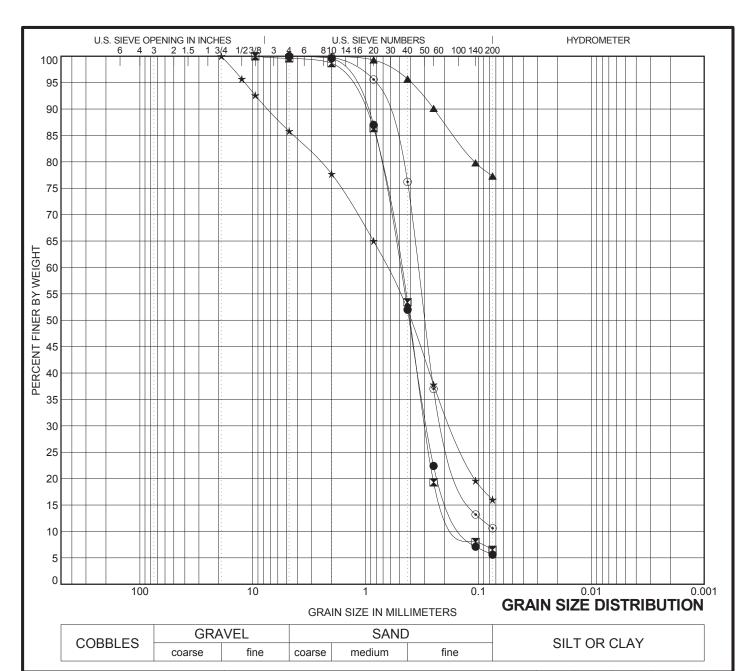
PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS ENGINEERING

Minimum ARRA-funded Segment

Merced to Fresno Section of the California High-Speed Train Project,

JOB NO:2009-138-400 PL

PLATE NO: B-3D



В	ORING SAI	MPLE#	DEPTH (ft)		С	lassification			LL	PL	PI	Сс	Cu
•	S0005A	S09	41.0		Poorly gra	ded SAND	with SILT					1.32	3.99
×	S0005A	S12	56.0		Poorly gra	ded SAND	with SILT					1.45	3.96
A	S0005A	S15	70.0										
*	S0005A	S17	81.0		SILTY SAND								
$\odot$	S0005A	S18	86.0		Poorly gra	ded SAND	with SILT					1.60	4.93
В	ORING SAI	MPLE#	DEPTH (ft)	D100	D60	D30	D10	%Gravel	%S	and	%Silt	9	6Clay
•	S0005A	S09	41.0	4.75	0.498	0.286	0.125	0.0	94	4.4		5.6	
×	S0005A	S12	56.0	9.5	0.488	0.295	0.123	0.4	93	3.1		6.5	
▲	S0005A	S15	70.0	2				0.0	22.7		77.3		
*	S0005A	S17	81.0	19	0.651	0.173		14.2	69	9.8		16.0	
$\odot$	S0005A	S18	86.0	4.75	0.341	0.194		0.0	89	9.4		10.6	



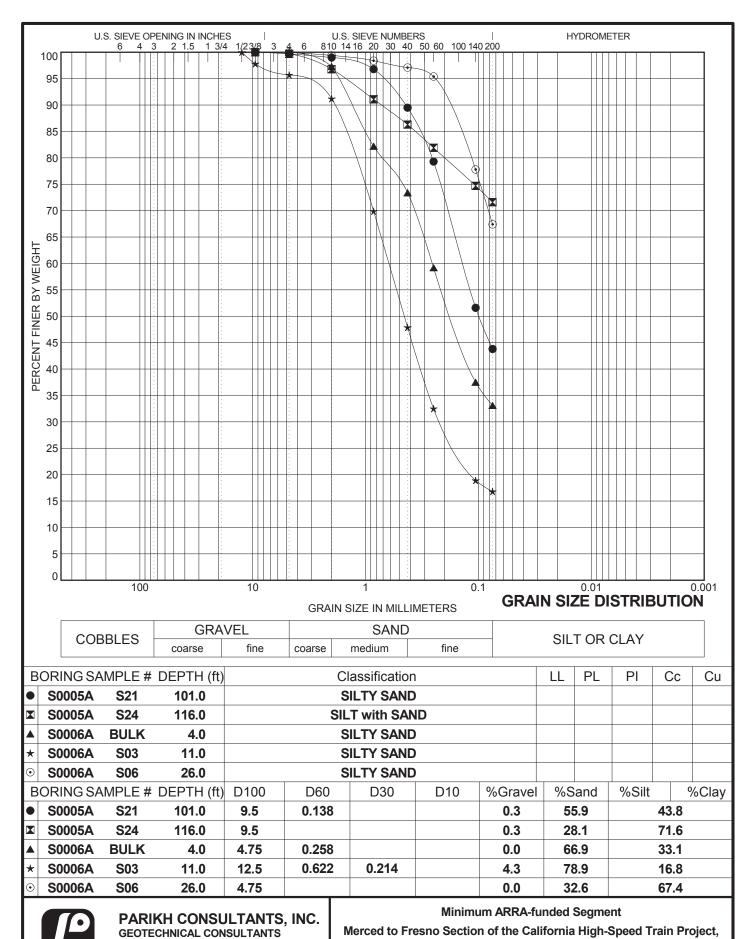
PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS ENGINEERING

Minimum ARRA-funded Segment

Merced to Fresno Section of the California High-Speed Train Project,

JOB NO:2009-138-400

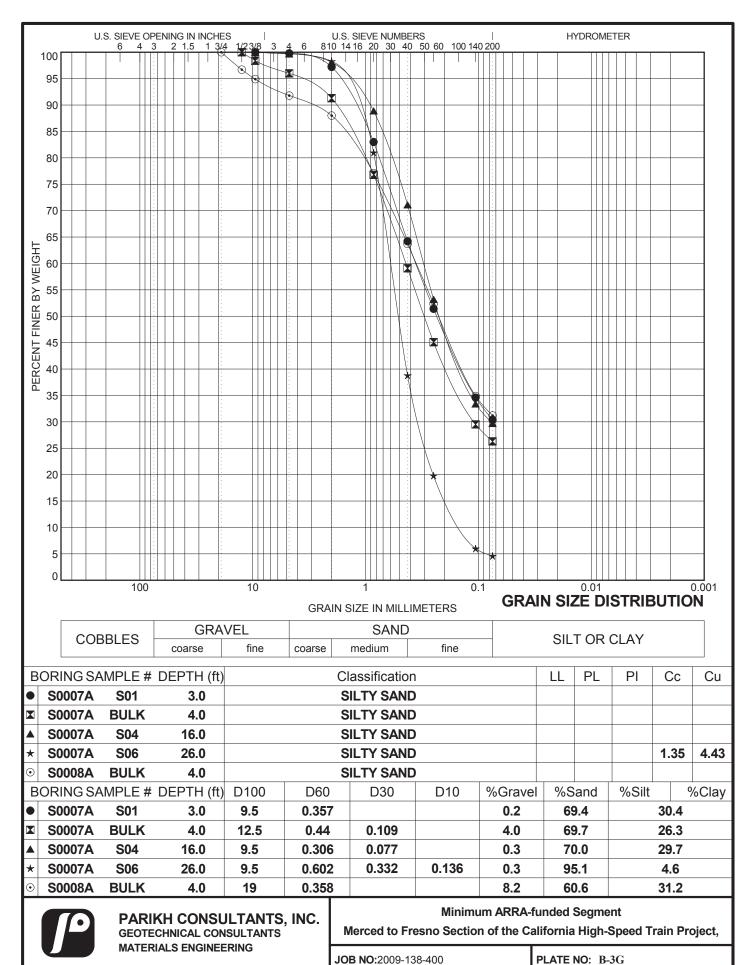
PLATE NO: B-3E

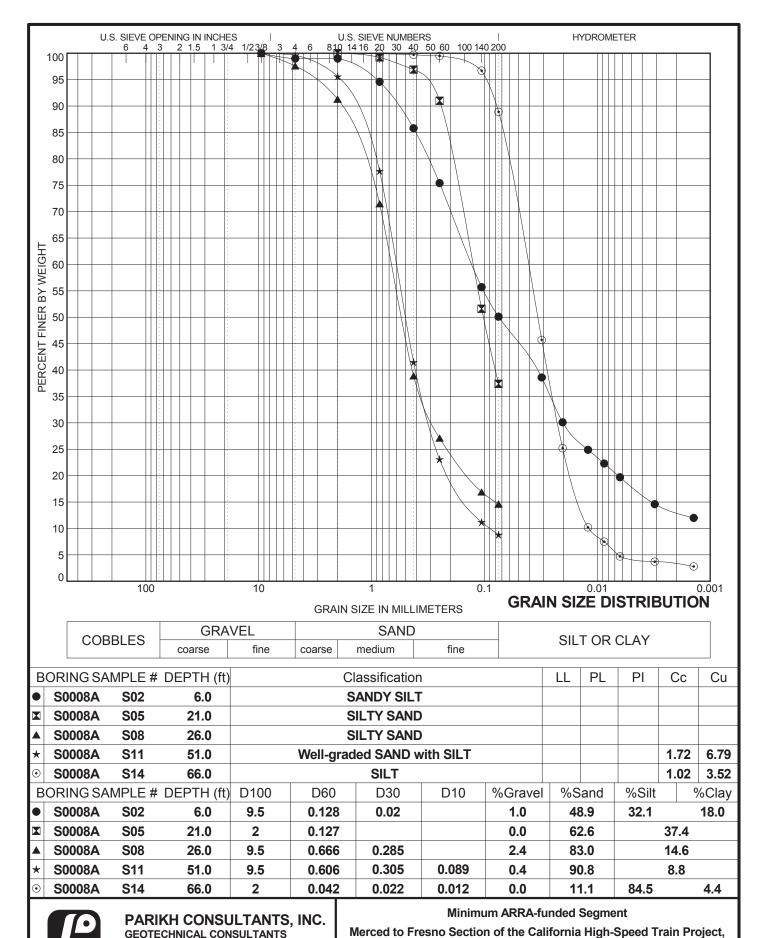


JOB NO:2009-138-400

PLATE NO: B-3F

**MATERIALS ENGINEERING** 

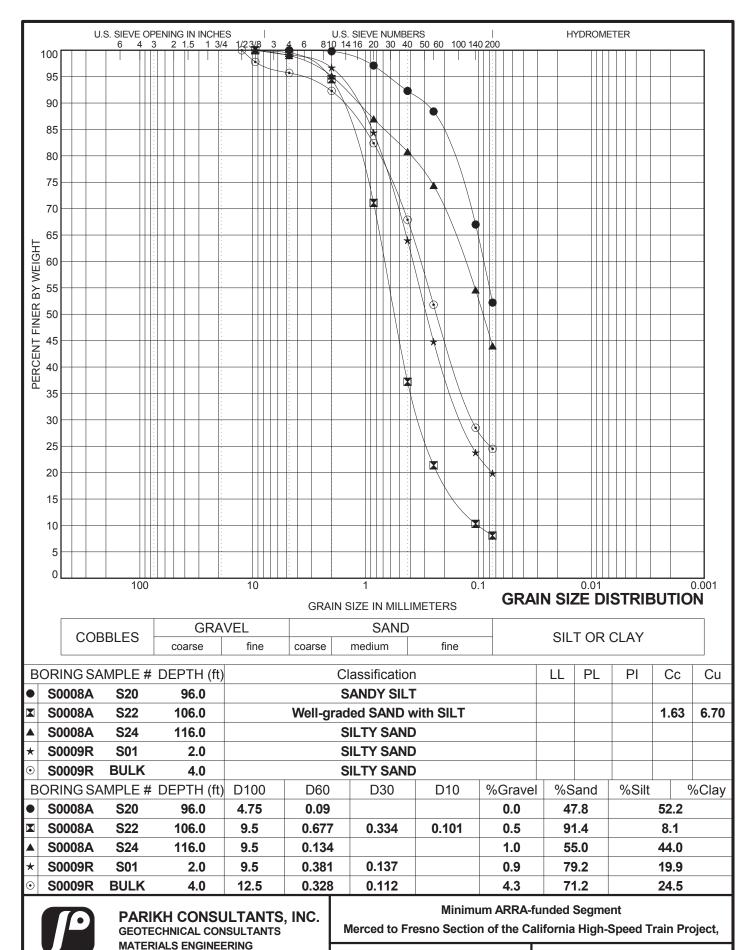




JOB NO:2009-138-400

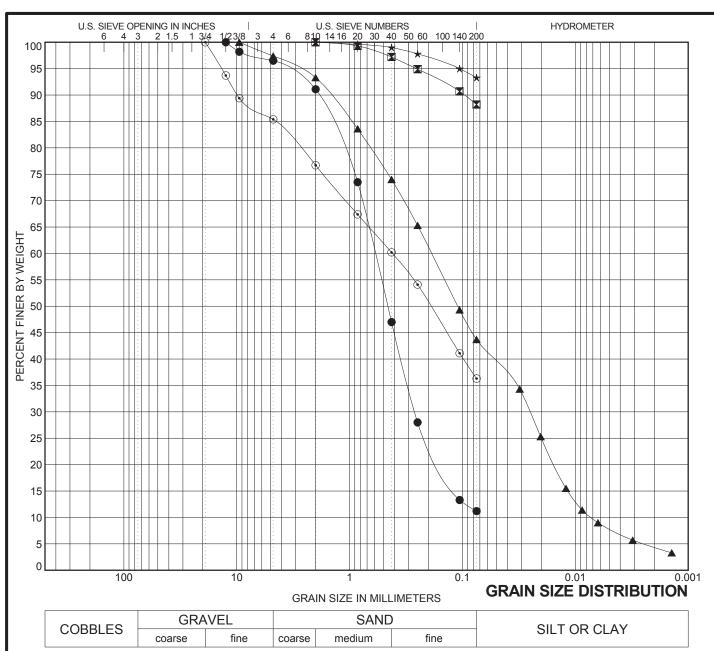
PLATE NO: B-3H

**MATERIALS ENGINEERING** 



JOB NO:2009-138-400

PLATE NO: B-3I



_													
В	ORING SA	MPLE#	DEPTH (ft)		С	lassificatior	า		LL	PL	PI	Сс	Cu
•	S0009R	S04	16.0		Well-graded SAND with SILT							1.90	9.70
×	S0009R	S07	31.0		SILT								
<b>A</b>	S0009R	S11	51.0		SILTY SAND							0.47	26.11
*	S0009R	S17	81.0			SILT							
$\odot$	S0009R	S18	86.0		CL	AYEY SAN	ID						
В	ORING SA	MPLE#	DEPTH (ft)	D100	D60	D30	D10	%Gravel	%S	Sand	%Silt		%Clay
•	S0009R	S04	16.0	12.5	0.597	0.264		3.5	8	5.3		11.2	
X	S0009R	S07	31.0	2				0.0	1	1.8		88.2	
	S0009R	S11	51.0	9.5	0.188	0.025	0.007	2.6	5	3.7	35.8		7.9
*	S0009R	S17	81.0	2				0.0	6	6.7		93.3	
$\odot$	S0009R	S18	86.0	19	0.418			14.6	4	9.1		36.3	



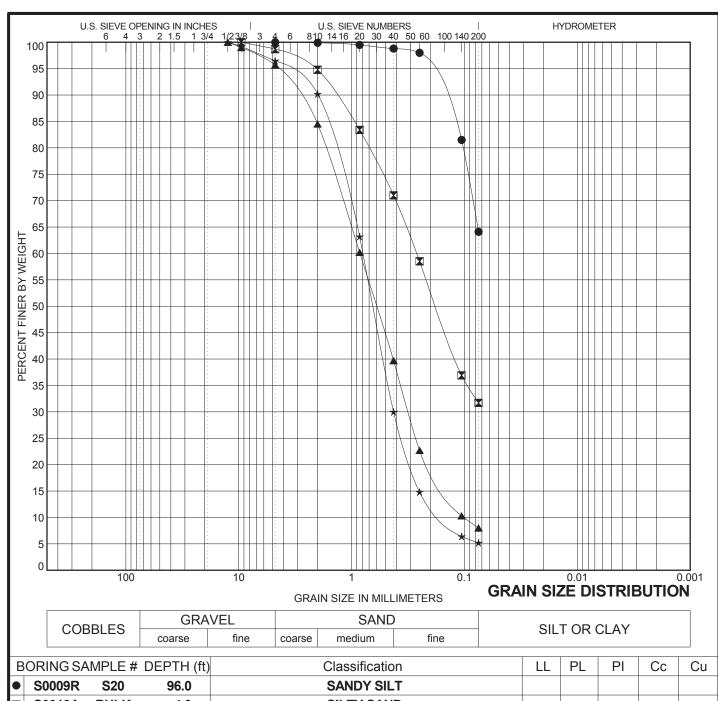
PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS ENGINEERING

Minimum ARRA-funded Segment

Merced to Fresno Section of the California High-Speed Train Project,

**JOB NO:**2009-138-400

PLATE NO: B-3J



ORING SA	MPLE #	DEPTH (ft)		Classification					PL	PI	Сс	Cu
S0009R	S20	96.0		S	ANDY SIL1	•						
S0010A	BULK	4.0		S	ILTY SAND	)						
S0010A	S03	11.0		Poorly graded SAND with SILT							1.15	8.33
S0010A	S06	26.0	Poorly graded SAND with SILT							1.48	5.19	
ORING SA	MPLE #	DEPTH (ft)	D100	D60	D30	D10	%Gravel	%S	and	%Silt	Q	%Clay
S0009R	S20	96.0	4.75				0.0	35	5.9		64.1	
S0010A	BULK	4.0	9.5	0.266			1.3	67	<sup>7</sup> .0		31.7	
S0010A	S03	11.0	12.5	0.844	0.314	0.101	4.3	87	7.7		8.0	
S0010A	S06	26.0	12.5	0.795	0.425	0.153	3.5	91	1.3		5.2	
	\$0009R \$0010A \$0010A \$0010A ORING SA \$0009R \$0010A \$0010A	S0009R         S20           S0010A         BULK           S0010A         S03           S0010A         S06   ORING SAMPLE # S0009R S20 S0010A BULK S0010A S03	S0010A         BULK         4.0           S0010A         S03         11.0           S0010A         S06         26.0   ORING SAMPLE # DEPTH (ft) S0009R S20 96.0 S0010A BULK 4.0 S0010A S03 11.0	S0009R         S20         96.0           S0010A         BULK         4.0           S0010A         S03         11.0           S0010A         S06         26.0           ORING SAMPLE # DEPTH (ft)         D100           S0009R         S20         96.0         4.75           S0010A         BULK         4.0         9.5           S0010A         S03         11.0         12.5	S0009R         S20         96.0         S           S0010A         BULK         4.0         S           S0010A         S03         11.0         Poorly gra           S0010A         S06         26.0         Poorly gra           ORING SAMPLE # DEPTH (ft)         D100         D60           S0009R         S20         96.0         4.75           S0010A         BULK         4.0         9.5         0.266           S0010A         S03         11.0         12.5         0.844	S0009R         S20         96.0         SANDY SILT           S0010A         BULK         4.0         SILTY SAND           S0010A         S03         11.0         Poorly graded SAND           S0010A         S06         26.0         Poorly graded SAND           ORING SAMPLE # DEPTH (ft)         D100         D60         D30           S0009R         S20         96.0         4.75           S0010A         BULK         4.0         9.5         0.266           S0010A         S03         11.0         12.5         0.844         0.314	S0009R         S20         96.0         SANDY SILT           S0010A         BULK         4.0         SILTY SAND           S0010A         S03         11.0         Poorly graded SAND with SILT           S0010A         S06         26.0         Poorly graded SAND with SILT           ORING SAMPLE # DEPTH (ft)         D100         D60         D30         D10           S0009R         S20         96.0         4.75         S0010A         BULK         4.0         9.5         0.266           S0010A         S03         11.0         12.5         0.844         0.314         0.101	S0009R         S20         96.0         SANDY SILT           S0010A         BULK         4.0         SILTY SAND           S0010A         S03         11.0         Poorly graded SAND with SILT           S0010A         S06         26.0         Poorly graded SAND with SILT           ORING SAMPLE # DEPTH (ft)         D100         D60         D30         D10         %Gravel           S0009R         S20         96.0         4.75         0.0           S0010A         BULK         4.0         9.5         0.266         1.3           S0010A         S03         11.0         12.5         0.844         0.314         0.101         4.3	S0009R         S20         96.0         SANDY SILT           S0010A         BULK         4.0         SILTY SAND           S0010A         S03         11.0         Poorly graded SAND with SILT           S0010A         S06         26.0         Poorly graded SAND with SILT           ORING SAMPLE # DEPTH (ft)         D100         D60         D30         D10         %Gravel         %S           S0009R         S20         96.0         4.75         0.0         35           S0010A         BULK         4.0         9.5         0.266         1.3         67           S0010A         S03         11.0         12.5         0.844         0.314         0.101         4.3         87	S0009R         S20         96.0         SANDY SILT           S0010A         BULK         4.0         SILTY SAND           S0010A         S03         11.0         Poorly graded SAND with SILT           S0010A         S06         26.0         Poorly graded SAND with SILT           ORING SAMPLE # DEPTH (ft)         D100         D60         D30         D10         %Gravel         %Sand           S0009R         S20         96.0         4.75         0.0         35.9           S0010A         BULK         4.0         9.5         0.266         1.3         67.0           S0010A         S03         11.0         12.5         0.844         0.314         0.101         4.3         87.7	S0009R         S20         96.0         SANDY SILT           S0010A         BULK         4.0         SILTY SAND           S0010A         S03         11.0         Poorly graded SAND with SILT           S0010A         S06         26.0         Poorly graded SAND with SILT           ORING SAMPLE # DEPTH (ft)         D100         D60         D30         D10         %Gravel         %Sand         %Silt           S0009R         S20         96.0         4.75         0.0         35.9           S0010A         BULK         4.0         9.5         0.266         1.3         67.0           S0010A         S03         11.0         12.5         0.844         0.314         0.101         4.3         87.7	S0009R         S20         96.0         SANDY SILT           S0010A         BULK         4.0         SILTY SAND           S0010A         S03         11.0         Poorly graded SAND with SILT         1.15           S0010A         S06         26.0         Poorly graded SAND with SILT         1.48           ORING SAMPLE # DEPTH (ft)         D100         D60         D30         D10         %Gravel         %Sand         %Silt         %S0009R         S20         96.0         4.75         0.0         35.9         64.1           S0010A         BULK         4.0         9.5         0.266         1.3         67.0         31.7           S0010A         S03         11.0         12.5         0.844         0.314         0.101         4.3         87.7         8.0



PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS ENGINEERING

Minimum ARRA-funded Segment

Merced to Fresno Section of the California High-Speed Train Project,

**JOB NO:**2009-138-400

PLATE NO: B-3K

#### Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils (Quick Undrained)



Client	AECOM	Lab Ref	G757
Project	CALIFORNIA HIGH-SPEED TRAIN PROJECT	Job	2009-138- 400
Borehole	S0001A	Sample	S12

Test & Sample Details							
Standard	ASTM D2850-95 / AASHTO T296-94	Sample Depth	56.00 ft				
Sample Type	Modified California Sampler	Sp. Gravity of Solids	2.65				
Sample Description	Silt, yellowish brown	Lab. Temperature	75.4 deg.F				
Variations from Procedure	None						

Specimen Details						
Specimen Reference	Α	Stage Reference	1			
Initial Height	5.0000 in	Description				
Initial Diameter	2.4160 in	Depth within Sample	0.0000 in			
Initial Dry Unit Weight	99.30 lbf/ft3	Orientation within Sample				
Initial Moisture Content*	24.7 % (trimmings: 23.6 %)	Preparation				
Void Ratio	0.67	Degree of Saturation	98.21%			
Comments						

<sup>\*</sup> Calculated from initial and dry weights of whole specimen

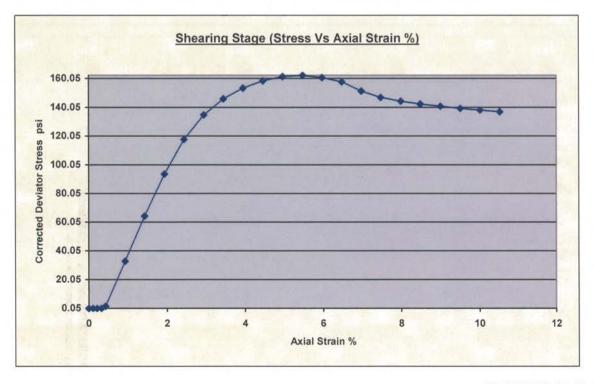


PLATE NO: B-4A-1

#### Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils (Quick Undrained)



Client	AECOM	Lab Ref	G757
Project	CALIFORNIA HIGH-SPEED TRAIN PROJECT	Job	2009-138- 400
Borehole	S0001A	Sample	S12

The state of the s	Shear	Conditions	
Rate of Axial Strain	0.30%/min	0.30%/min Cell Pressure	
	Condition	ons at Failure	
Failure Criterion	Maximum Deviate	or Stress	
Compressive Strength	162.28 psi	Major Principal Stress	210.86 psi
Axial Strain	5.47%	Minor Principal Stress	48.58 psi
Deviator Stress Correction Applied	0.220psi	Final Moisture Content	24.6 %
Final Unit Weight	123.68 lbf/ft3		



Tested By and Date:	P Dayah 11/10/11
Checked By and Date:	
Approved By and Date:	

Mode of Failure



11353 Pyrites Way, Suite 4 Rancho Cordova, CA 95670 (916) 852-8557

> Date Reported 12/07/2011 Date Submitted 12/01/2011

To: Prav Dayah Parikh Consultants, Inc. 2360 Qume Dr. Ste.A San Jose, CA 95131

From: Gene Oliphant, Ph.D. \ Randy Horney General Manager \ Lab Manager

The reported analysis was requested for the following location: Location : 2009-138-400/CA.HSTP Site ID : S0001A#S02 @ 6'. Thank you for your business.

\* For future reference to this analysis please use SUN # 61450-126289.

EVALUATION FOR SOIL CORROSION

Soil pH

6.31

Minimum Resistivity 2.60 ohm-cm (x1000)

Chloride

40.5 ppm

00.00405 %

Sulfate

26.6 ppm

00.00266 %

METHODS



11353 Pyrites Way, Suite 4 Rancho Cordova, CA 95670 (916) 852-8557

> Date Reported 12/07/2011 Date Submitted 12/01/2011

To: Prav Dayah Parikh Consultants, Inc. 2360 Qume Dr, Ste.A San Jose, CA

From: Gene Oliphant, Ph.D. \ Randy Horney General Manager \ Lab Manager

The reported analysis was requested for the following location: Location : 2009-138-400/CA. HSTP Site ID : S0002A#S02 @ 6'. Thank you for your business.

\* For future reference to this analysis please use SUN # 61450-126290. 

EVALUATION FOR SOIL CORROSION

Soil pH

6.56

Minimum Resistivity

5.36 ohm-cm (x1000)

Chloride

5.4 ppm 00.00054 %

Sulfate

0.8 ppm

00.00008 %

METHODS



11353 Pyrites Way, Suite 4 Rancho Cordova, CA 95670 (916) 852-8557

> Date Reported 12/07/2011 Date Submitted 12/01/2011

To: Prav Dayah Parikh Consultants, Inc.

2360 Qume Dr, Ste.A

San Jose, CA

95131

From: Gene Oliphant, Ph.D. \ Randy Horney General Manager \ Lab Manager \

The reported analysis was requested for the following location: Location : 2009-138-400/CA.HSTP Site ID : S0003A#S02 @ 6'. Thank you for your business.

\* For future reference to this analysis please use SUN # 61450-126291. 

EVALUATION FOR SOIL CORROSION

Soil pH 7.84

Minimum Resistivity 2.95 ohm-cm (x1000)

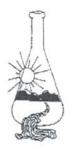
Chloride

10.4 ppm 00.00104 %

Sulfate

25.8 ppm 00.00258 %

METHODS



11353 Pyrites Way, Suite 4 Rancho Cordova, CA 95670 (916) 852-8557

> Date Reported 12/07/2011 Date Submitted 12/01/2011

To: Prav Dayah Parikh Consultants, Inc. 2360 Qume Dr, Ste.A San Jose, CA

From: Gene Oliphant, Ph.D. \ Randy Horney General Manager \ Lab Manager

The reported analysis was requested for the following location: Location : 2009-138-400/CA.HSTP Site ID : S0005A#S02 @ 6'. Thank you for your business.

\* For future reference to this analysis please use SUN # 61450-126296.

#### EVALUATION FOR SOIL CORROSION

Soil pH

8.16

Minimum Resistivity 0.99 ohm-cm (x1000)

Chlorida

27.3 ppm

00.00273 %

Sulfate

45.4 ppm 00.00454 %

#### METHODS



11353 Pyrites Way, Suite 4 Rancho Cordova, CA 95670 (916) 852-8557

> Date Reported 12/07/2011 Date Submitted 12/01/2011

To: Prav Dayah Parikh Consultants, Inc. 2360 Qume Dr. Ste.A San Jose, CA

From: Gene Oliphant, Ph.D. \ Randy Horney General Manager \ Lab Manager

The reported analysis was requested for the following location: Location : 2009-138-400/CA.HSTP Site ID : S0006A#2 @ 6'. Thank you for your business.

\* For future reference to this analysis please use SUN # 61450-126292. 

EVALUATION FOR SOIL CORROSION

Soil pH

7.83

Minimum Resistivity

7.50 ohm-cm (x1000)

Chloride

14.0 ppm

00.00140 %

Sulfate

15.8 ppm 00.00158 %

METHODS



11353 Pyrites Way, Suite 4 Rancho Cordova, CA 95670 (916) 852-8557

> Date Reported 12/07/2011 Date Submitted 12/01/2011

To: Prav Dayah
Parikh Consultants, Inc.
2360 Qume Dr, Ste.A
San Jose, CA 95131

From: Gene Oliphant, Ph.D. \ Randy Horney General Manager \ Lab Manager

The reported analysis was requested for the following location: Location: 2009-138-400/CA.HSTP Site ID: S0007A#2 @ 6'.
Thank you for your business.

\* For future reference to this analysis please use SUN # 61450-126294.

#### EVALUATION FOR SOIL CORROSION

Soil pH

8.09

Minimum Resistivity

3.75 ohm-cm (x1000)

Chloride

8.2 ppm

00.00082 %

Sulfate

15.0 ppm

00.00150 %

METHODS



11353 Pyrites Way, Suite 4 Rancho Cordova, CA 95670 (916) 852-8557

> Date Reported 12/07/2011 Date Submitted 12/01/2011

To: Prav Dayah
Parikh Consultants, Inc.
2360 Qume Dr, Ste.A
San Jose, CA
95131

Prom: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location: Location: 2009-138-400/CA.HSTP Site ID: S0008A#S03 @ 11.
Thank you for your business.

\* For future reference to this analysis please use SUN # 61450-126293.

EVALUATION FOR SOIL CORROSION

Soil pH

7.41

Minimum Resistivity

3.22 ohm-cm (x1000)

Chloride

13.6 ppm

00.00136 %

Sulfate

11.9 ppm

00.00119 %

METHODS



11353 Pyrites Way, Suite 4 Rancho Cordova, CA 95670 (916) 852-8557

> Date Reported 12/07/2011 Date Submitted 12/01/2011

To: Prav Dayah Parikh Consultants, Inc. 2360 Qume Dr, Ste.A 95131 San Jose, CA

From: Gene Oliphant, Ph.D. \ Randy Horney General Manager \ Lab Manager

The reported analysis was requested for the following location: Location : 2009-138-400/CA. HSTP Site ID : S0009A#2 @ 6'. Thank you for your business.

\* For future reference to this analysis please use SUN # 61450-126295. 

#### EVALUATION FOR SOIL CORROSION

Soil pH

8.88

Minimum Resistivity

5.90 ohm-cm (x1000)

Chloride

6.1 ppm

00.00061 %

Sulfate

10.0 ppm 00.00100 %

#### METHODS



11353 Pyrites Way, Suite 4 Rancho Cordova, CA 95670 (916) 852-8557

> Date Reported 12/07/2011 Date Submitted 12/01/2011

To: Prav Dayah Parikh Consultants, Inc.

2360 Qume Dr, Ste.A

San Jose, CA

95131

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location: Location: 2009-138-400/CA.HSTP Site ID: S0010A#S02 @ 6'.
Thank you for your business.

\* For future reference to this analysis please use SUN # 61450-126297.

EVALUATION FOR SOIL CORROSION

Soil pH

7.38

Minimum Resistivity

13.40 ohm-cm (x1000)

Chloride

6.0 ppm

00.00060 %

Sulfate

0.1 ppm

00.00001 %

METHODS

(Consolidated-Undrained)

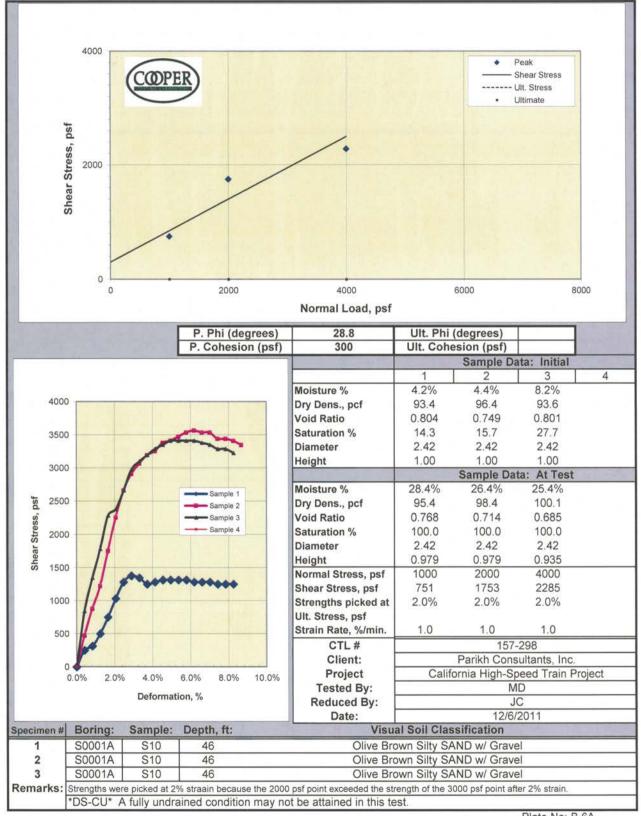


Plate No: B-6A

(Consolidated-Undrained)

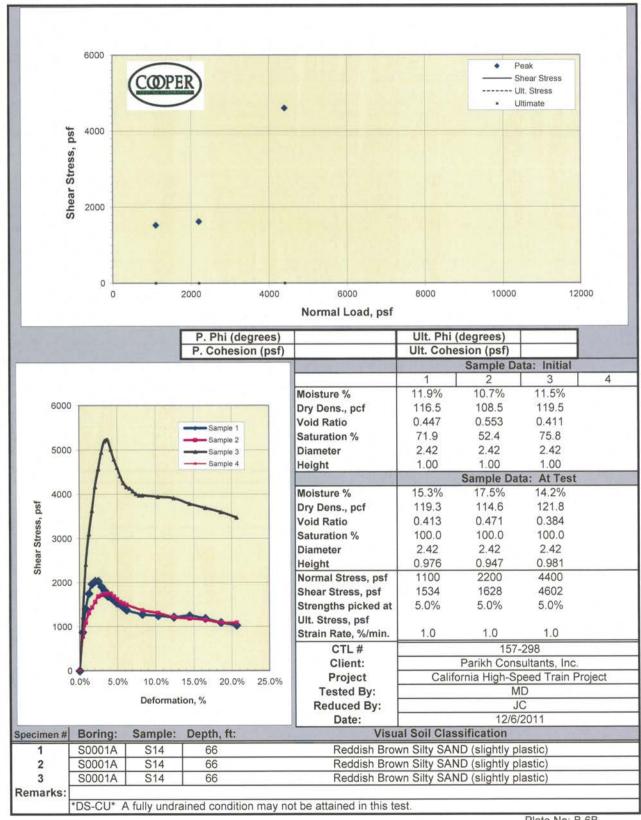


Plate No: B-6B

(Consolidated-Undrained)

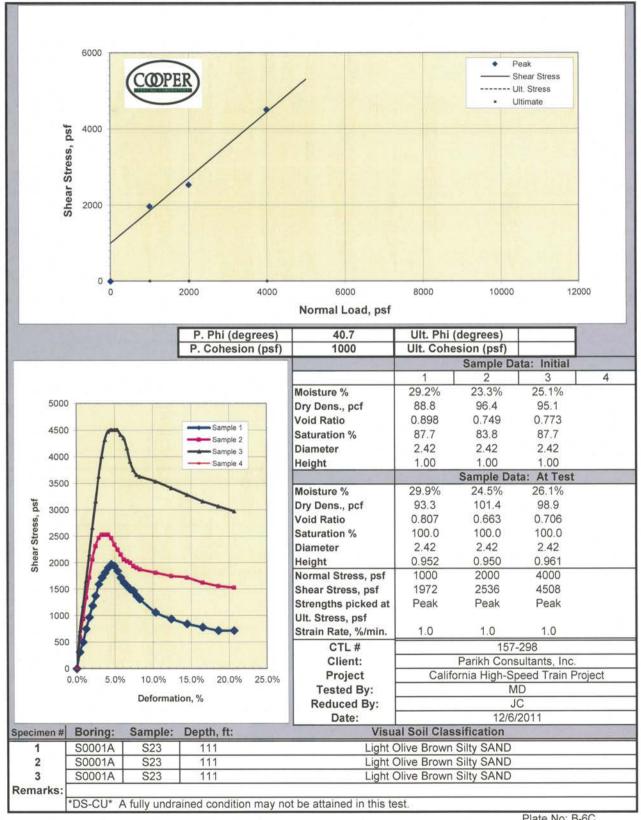
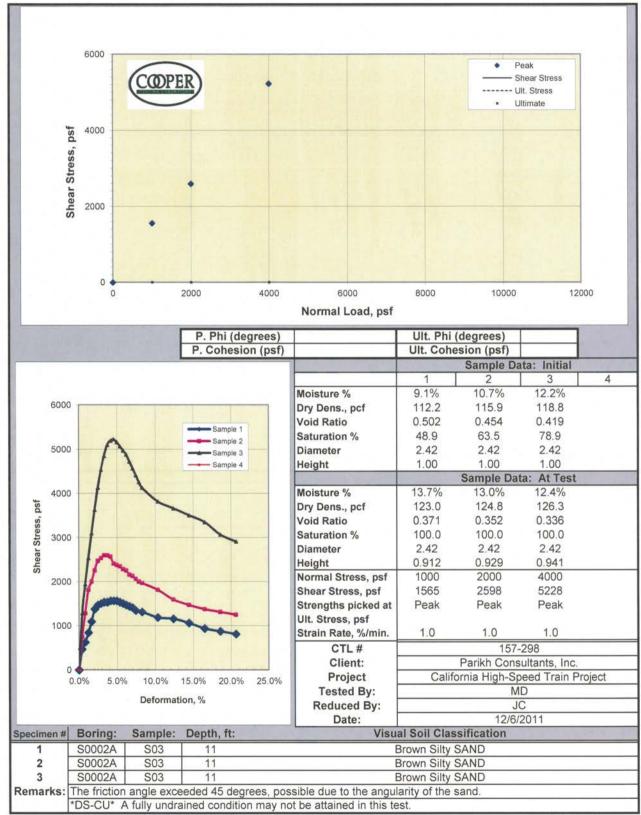


Plate No: B-6C

(Consolidated-Undrained)



(Consolidated-Undrained)

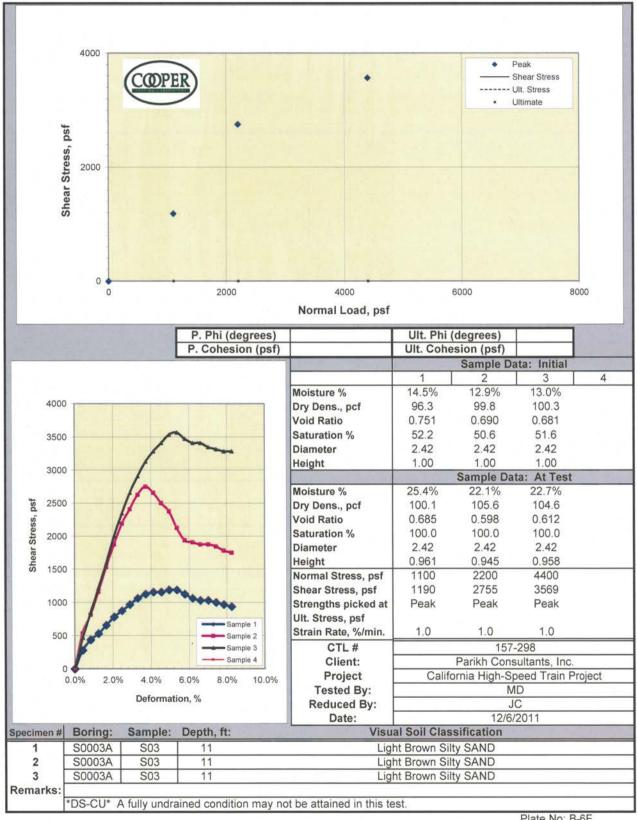
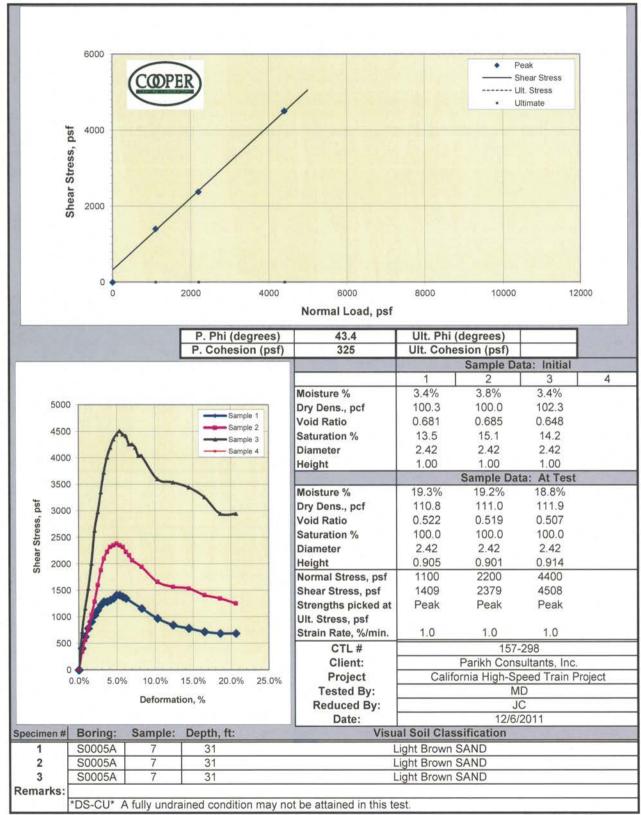


Plate No: B-6E

(Consolidated-Undrained)



(Consolidated-Undrained)

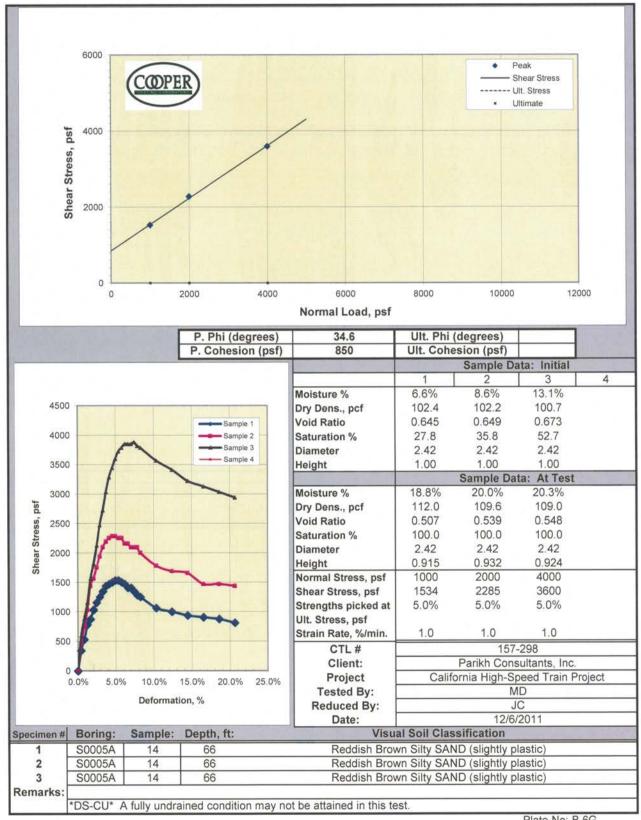


Plate No: B-6G

(Consolidated-Undrained)

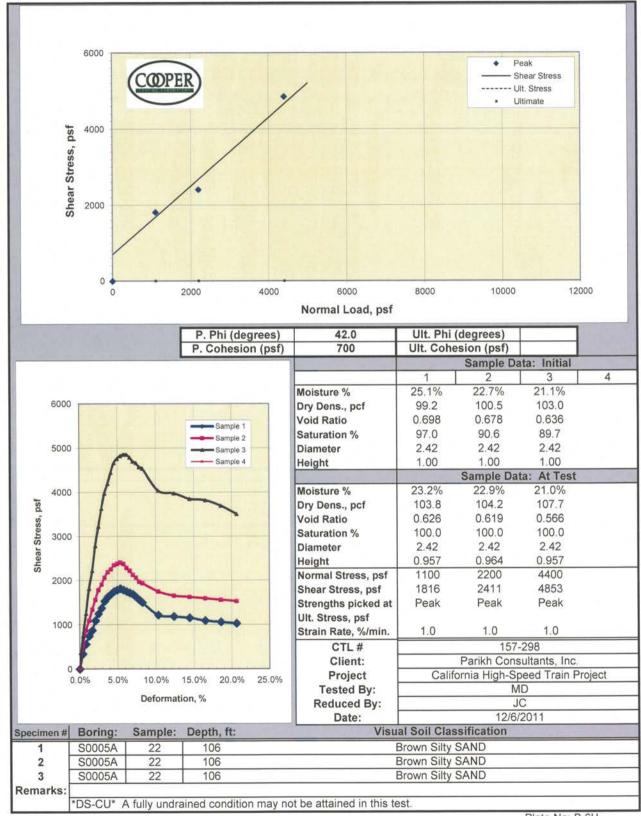
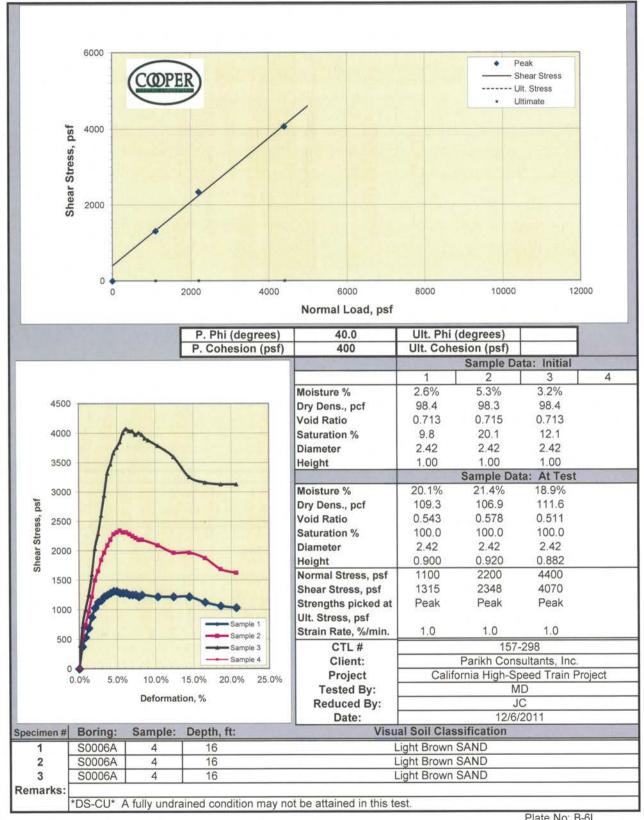
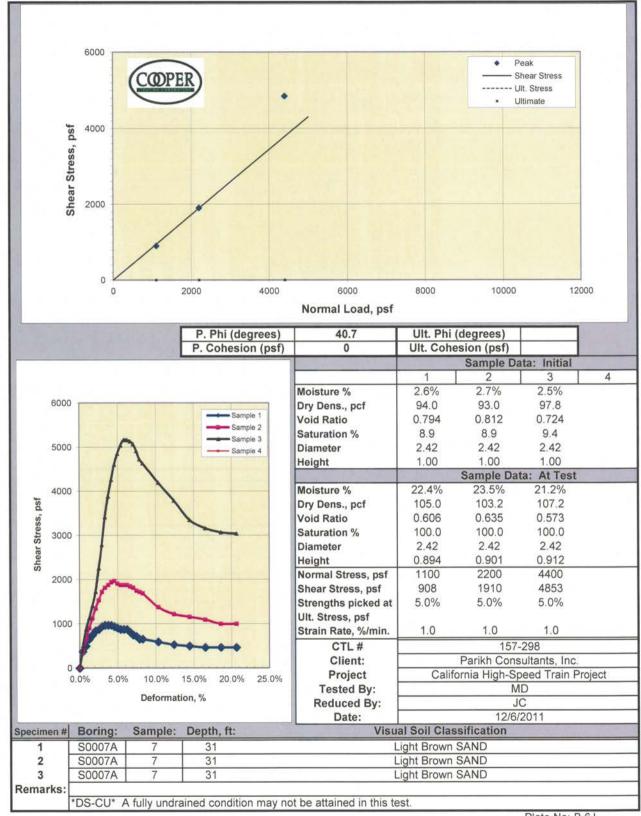


Plate No: B-6H

(Consolidated-Undrained)



(Consolidated-Undrained)



(Consolidated-Undrained)

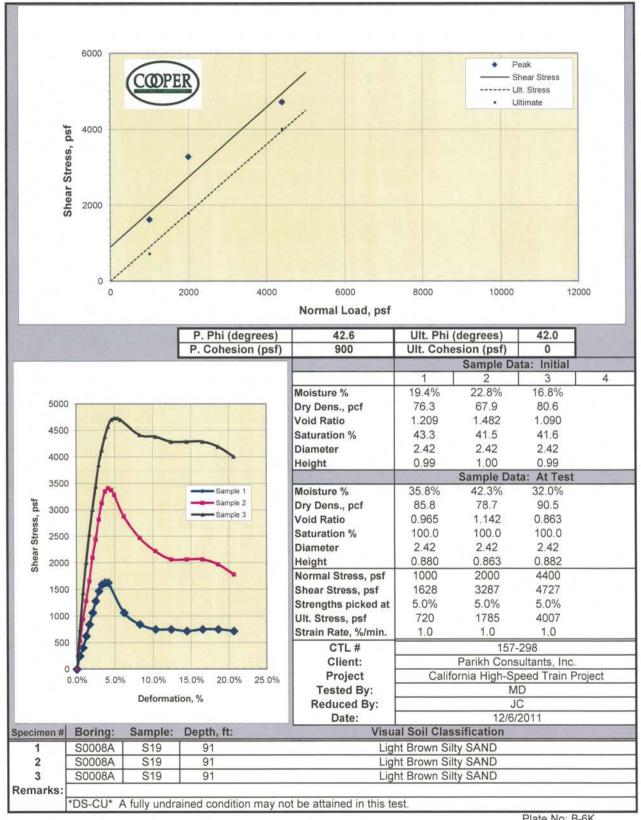


Plate No: B-6K

(Consolidated-Undrained)

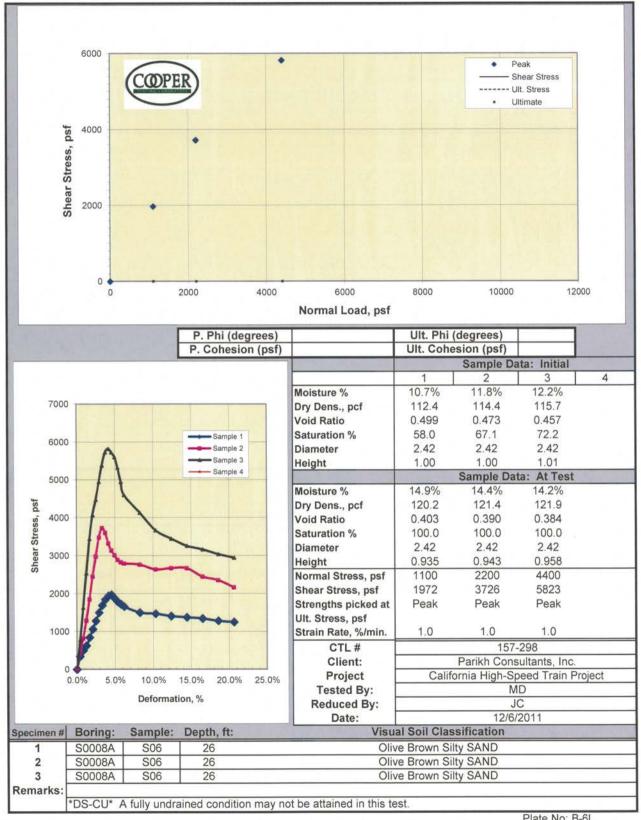
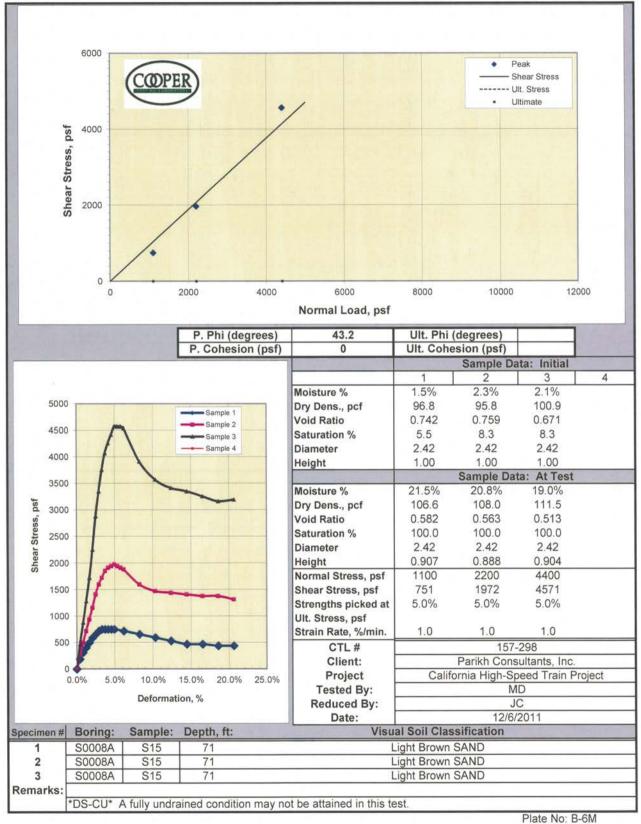


Plate No: B-6L

(Consolidated-Undrained)



(Consolidated-Undrained)

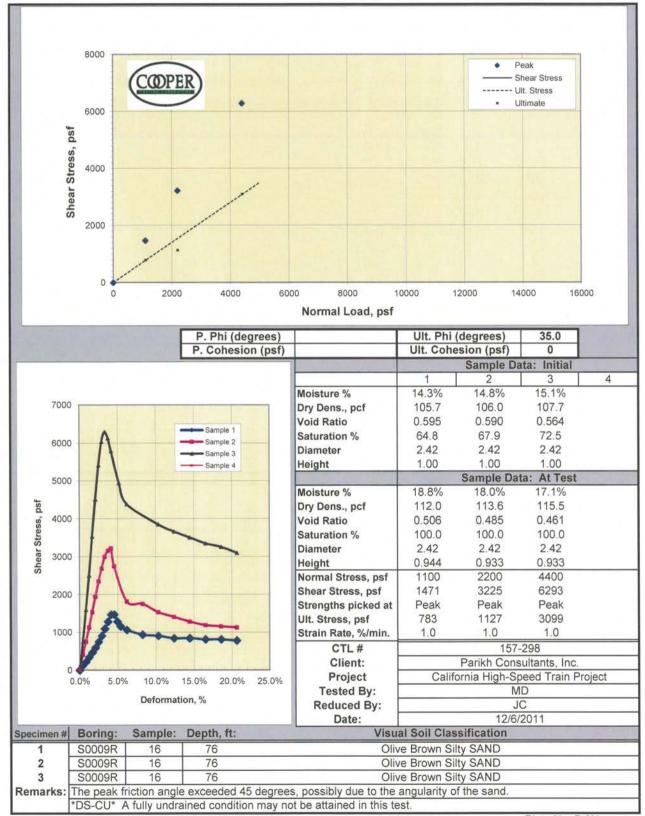
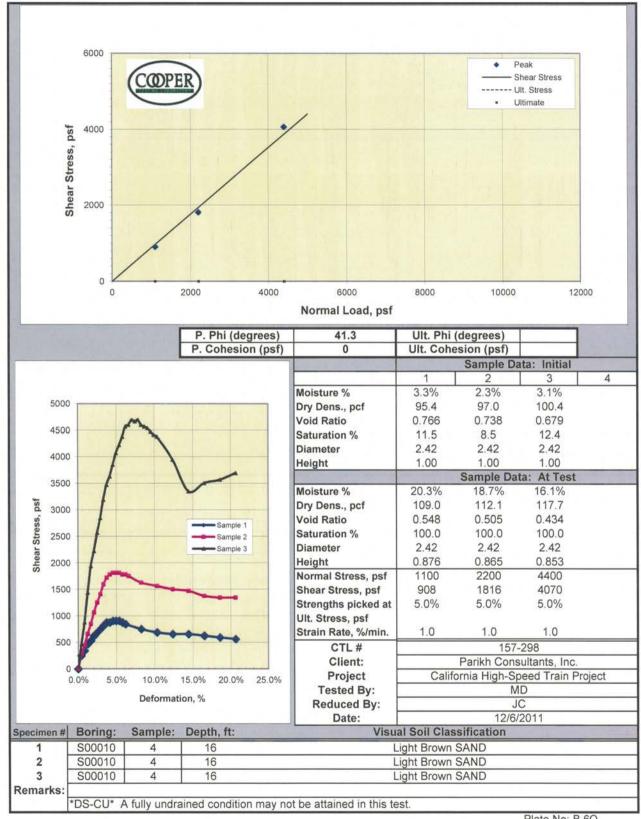
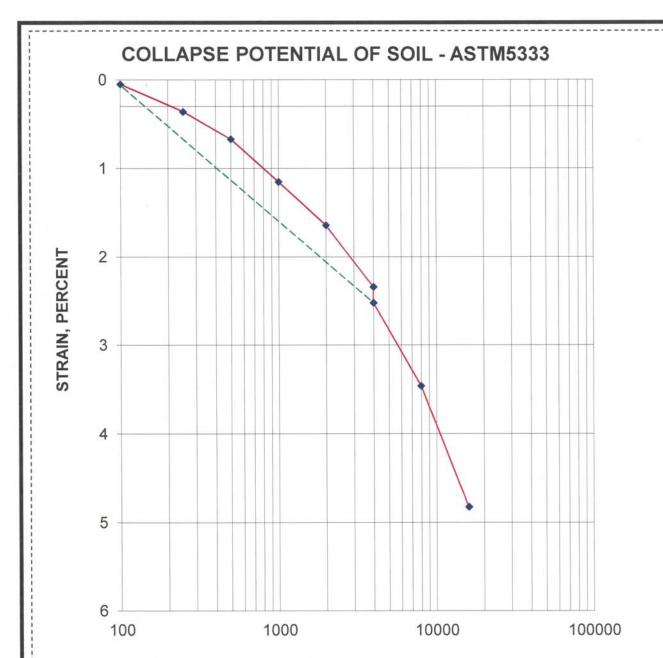


Plate No: B-6N

(Consolidated-Undrained)





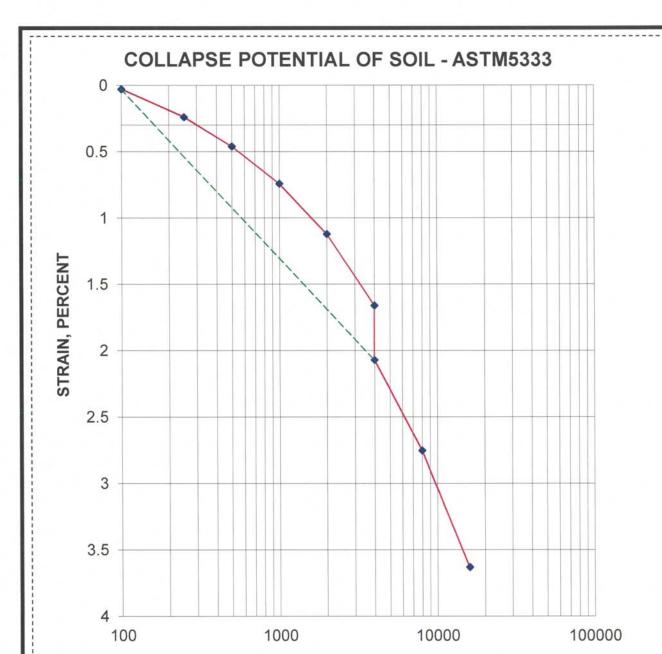
#### APPLIED VERTICAL STRESS, POUNDS PER SQUARE FOOT

	MOISTURE CONTENT %	DRY DENSITY PCF	HEIGHT (INCHES)	DIAMETER (INCHES)
INITIAL	14.0	107.5	1.0000	2.416
FINAL	18.1	112.9	0.9518	2.416

BORING NO.	S0001A	SAMPLE NO.	S15	ELEV. OR DEPTH	71'
DESCRIPTION	Silty fine Sand, b	rown (Undisturbed)			



MINIMUM ARRA - FUNDED SEGMENT - CHST AECOM						
DATE 12/2/2011	JOB NO:	2009-138-400				
Reported by: Prav	Dayah	PLATE NO: B-7A				



#### APPLIED VERTICAL STRESS, POUNDS PER SQUARE FOOT

	MOISTURE CONTENT %	DRY DENSITY PCF	HEIGHT (INCHES)	DIAMETER (INCHES)
INITIAL	4.8	125.3	1.0000	2.416
FINAL	10.2	130.0	0.9637	2.416

BORING NO.	S0010A	SAMPLE NO.	S01	ELEV. OR DEPTH	3'
DESCRIPTION	Silty fine Sand, bi	rown (Undisturbed)			



MINIMUM ARRA - FUNDED SEGMENT - CHST AECOM						
DATE 12/8/2011	JOB NO:	2009-138-400				
Reported by: Prav	Dayah	PLATE NO: B-7B				

# 86/29/2012 ADDENDUM 3 - RFP HSR 11-16

		LABORATORY	TEST REPORT	(408)-452-9000
				Parikh Consultants, Inc.
PROJECT NAME:	MINIMUM ARRA	- FUNDED SEGMENT - CHST	PROJECT #:	2009-138-400
SAMPLE #:	S0002A	DEPTH: 2'-5'	LAB #:	M837
SOURCE:	Fresno / Native		DATE:	12/2/2011
MATERIAL DESC	RIPTION Silty Fir	ne Sand, brown		

#### **EXPANSION INDEX - ASTM D-4829**

Expansion Index			0		Specification
Corrected Expansion Index			(	)	
Expansion Potential			Very	Low	
Saturation %	Initial:	52	Final:	74	
Moisture Contenet%	Initial:	7.1	Final:	10.0	_
Dry Density, pcf	Initial:	123.0	Final:	123.0	

#### SAND EQUIVALENT CTM 217

	Specifications
SE	

Sieve Analysis CTM 202					
Sieve	Percent Passing	Project Specification			
Size	rassing	Specification			
3"					
1-1/2"					
1"					
3/4"					
3/8"					
No. 4					
No. 30					
No. 50					
No. 100					
No. 200					

_		_		•	
Co	m	m	Or	71	c.

Reported by : Prav Dayah

PLATE NO: B-8A

PARIKH CONSULTANT'S INC.

P		LABORATORY TEST		(408)-452-9000 Parikh Consultants, Inc.
	MINIMUM A	RRA - FUNDED SEGMENT - CHST		2009-138-400
SAMPLE #:	S0008A	DEPTH: 2'-5'	LAB #:	M837
SOURCE:	Fresno / Nativ	ve .	DATE:	12/2/2011
MATERIAL DESC	RIPTION Sile	ty Fine Sand, brown		12/2/2011

#### **EXPANSION INDEX - ASTM D-4829**

Expansion Index		0		Specification	
Corrected Expansion Index			(	)	
Expansion Potential			Very	Low	
Saturation %	Initial:	51	Final:	82	
Moisture Contenet%	Initial:	7.1	Final:	11.5	
Dry Density, pcf	Initial:	122.2	Final:	122.2	

#### SAND EQUIVALENT CTM 217

	Specification		
SE			

	Sieve Analysis CTM 202					
Sieve Size	Percent Passing	Project Specification				
6"						
3"						
1-1/2"						
1"						
3/4"						
3/8"						
No. 4						
No. 30						
No. 50						
No. 100						
No. 200						

Cama		-4
Com	$m \omega r$	ILC.
OUIII		ILO.

Reported by : Prav Dayah

PLATE NO: B-8B

PARIKH CONSULTANT'S INC.

ī		4		200		
		460		-		70
					-	- 18
					•	
	٠.	100				4
ŧ.				and the		
ť	1					
		100				
	٠:	w	_			-0

Client:

Location / Source:

#### R-VALUE REPORT

Parikh Consultants, Inc.

ASTM D2844 or CTM 301

Date:

Project #:

(408) 452-9000

11/27/11 2009-138-400

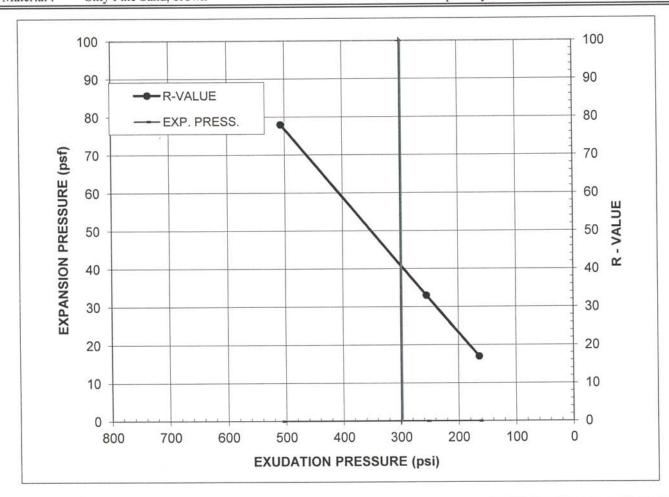
Project Name: MINIMUM ARRA - FUNDED SEGMENT - CHST

Fresno / Native

**AECOM** Lab #:

M837 2'-5' S0001A Depth: Sample #: Sample Date:

Sampled By: Silty Fine Sand, brown Material:



Specimen No.	A	В	C
Exudation Pressure, psi	164	255	507
Expansion Pressure, psf	0	0	0
R-Value	17	33	78
Moisture Content at Test, %	9.8	9.0	7.3
Dry Density at Test, pcf	126.4	128.4	130.6

R-Value @ 300 psi Exudation Pressure = 40	Expansion Pressure @300 psi Exudation, psf = 0
Minimum R-Value Requirement:	

Comments:

PLATE NO: B-9A Report By: Prav Dayah

:	Ξ	-
٠		
i		
ï		
	ŝ	
ŧ		THE RESIDENCE
į		THE RESERVE OF
	ē	The state of the s

#### R-VALUE REPORT

Parikh Consultants, Inc.

ASTM D2844 or CTM 301

(408) 452-9000

Project Name: MINIMUM ARRA - FUNDED SEGMENT - CHST

11/27/11 Date: Project #:

2009-138-400

Client: Sample #: **AECOM** S0005R

Depth: 2'-5' Lab #:

M837

Location / Source:

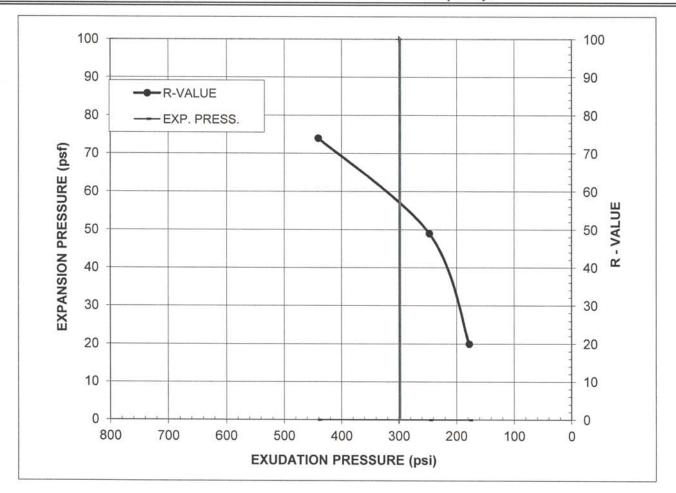
Fresno / Native

Sample Date:

Material:

Silty Fine Sand, brown

Sampled By:



Specimen No.	A	В	С
Exudation Pressure, psi	178	247	441
Expansion Pressure, psf	0	0	0
R-Value	20	49	74
Moisture Content at Test, %	11.3	10.4	9.5
Dry Density at Test, pcf	121.2	123.0	124.5

R-Value @ 300 psi Exudation Pressure =	57	Expansion Pressure @300 psi Exudation, psf =	0
Minimum R-Value Requirement:			

Comments:

Report By: Prav Dayah	PLATE NO: B-9B

9		CO.			
3	-				
		-		•	я
		-		-	
П		-	(Barrell		
3		-			
3					
	·	_			y

#### R-VALUE REPORT

Parikh Consultants, Inc. ASTM D2844 or CTM 301

(408) 452-9000

11/27/11

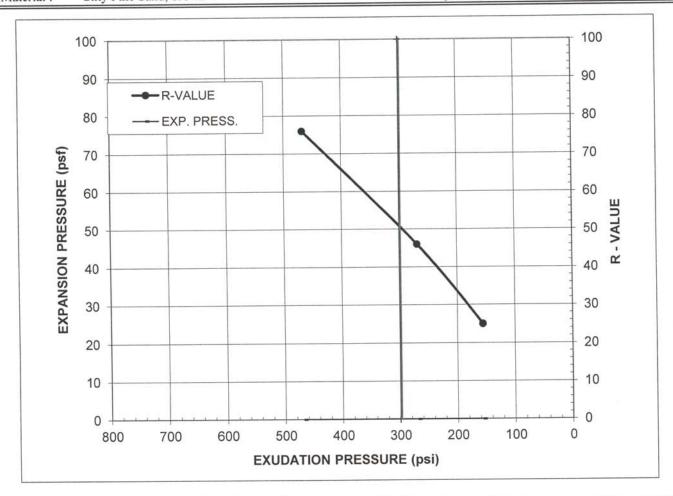
Project Name: MINIMUM ARRA - FUNDED SEGMENT - CHST Date:

Client: AECOM Project #: 2009-138-400

Sample #: S0006A Depth: 2'-5' Lab #: M837

Location / Source: Fresno / Native Sample Date:

Material: Silty Fine Sand, brown Sampled By:



Specimen No.	A	В	С	
Exudation Pressure, psi	156	269	468	
Expansion Pressure, psf	0	0	0	
R-Value	25	46	76	
Moisture Content at Test, %	10.0	8.7	7.8	
Dry Density at Test, pcf	124.6	127.4	128.6	

R-Value @ 300 psi Exudation Pressure =	50	Expansion Pressure @300 psi Exudation, psf =	0
Minimum R-Value Requirement:			

Comments:

Report By: Prav Dayah PLATE NO: B-9C

(D)		R-VALUE REPORT
	Parikh Consultants, Inc.	ASTM D2844 or CTM 301

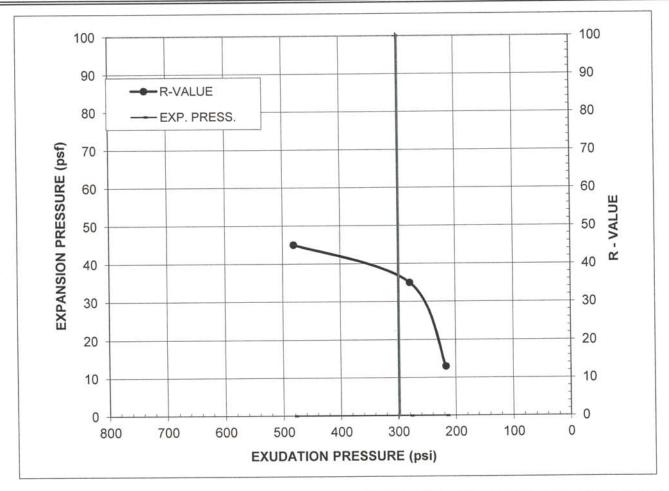
(408) 452-9000

Project Name: MINIMUM ARRA - FUNDED SEGMENT - CHST Date: 11/27/11 2009-138-400 Project #: **AECOM** Client:

Lab #: M837 2'-5' Sample #: S0008A Depth:

Sample Date: Location / Source: Fresno / Native

Sampled By: Material: Silty Fine Sand, brown



Specimen No.	A	В	С
Exudation Pressure, psi	217	279	481
Expansion Pressure, psf	0	0	0
R-Value	13	35	45
Moisture Content at Test, %	10.5	9.6	8.8
Dry Density at Test, pcf	122.9	123.3	129.3

R-Value @ 300 psi Exudation Pressure =	37	Expansion Pressure @300 psi Exudation, psf =	0
Minimum R-Value Requirement:			

Comments:

Report By: Prav Dayah	PLATE NO: B-9D

7	ā		-3	7		_
ø		•	ı			٧
			ı	•	٠,	в
и	Ŋ,		k		8	
н	u	- 1				
ч	7	А				9
	4		÷	-		٠.

### R-VALUE REPORT

Parikh Consultants, Inc.

ASTM D2844 or CTM 301

(408) 452-9000

Project Name: MINIMUM ARRA - FUNDED SEGMENT - CHST

Date:

11/27/11

Client:

**AECOM** S0009R

Depth:

2'-5'

Project #: Lab #:

2009-138-400

Location / Source:

Fresno / Native

M837

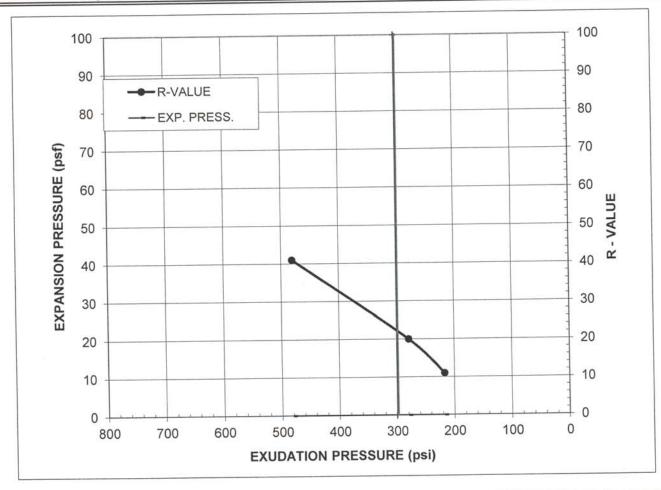
Sample Date:

Material:

Sample #:

Silty Fine Sand, brown

Sampled By:



150	261	432
217	279	481
0	0	0
11	20	41
8.3	7.4	6.6
128.3	130.9	133.3
	217 0 11 8.3	217 279 0 0 11 20 8.3 7.4

Expansion Pressure @300 psi Exudation, psf = 22 R-Value @ 300 psi Exudation Pressure = Minimum R-Value Requirement:

Comments:

Report By: Prav Dayah

PLATE NO: B-9E

	P
×	The second second

#### R-VALUE REPORT

Parikh Consultants, Inc.

ASTM D2844 or CTM 301

(408) 452-9000

Project Name: MINIMUM ARRA - FUNDED SEGMENT - CHST

Date:

11/27/11

Client:

**AECOM** 

Project #:

2009-138-400

Sample #:

S0010A

Depth: 2'-5'

Lab #:

M837

Location / Source:

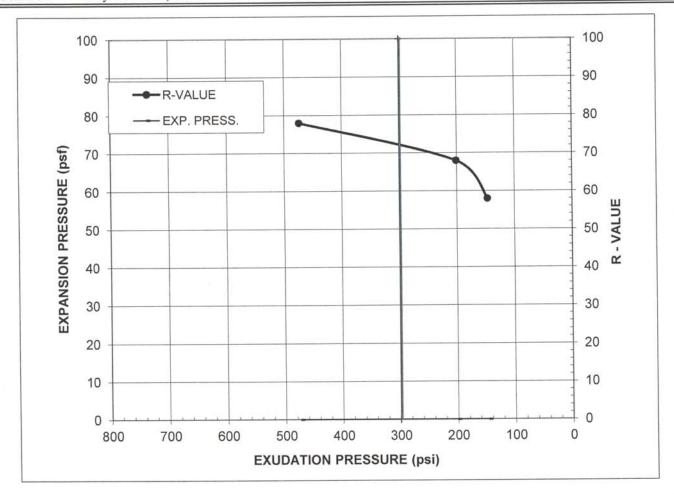
Fresno / Native

Sample Date:

Material:

Silty Fine Sand, brown

Sampled By:



Specimen No.	150	261	432	
Exudation Pressure, psi	147	201	474	
Expansion Pressure, psf	0	0	0	
R-Value	58	68	78	
Moisture Content at Test, %	11.6	11.2	10.7	
Dry Density at Test, pcf	123.3	124.6	124.9	
Dry Density at Test, pcf		1919000 0007 D		

R-Value @ 300 psi Exudation Pressure =	72	Expansion Pressure @300 psi Exudation, psf =	0
Minimum R-Value Requirement:			

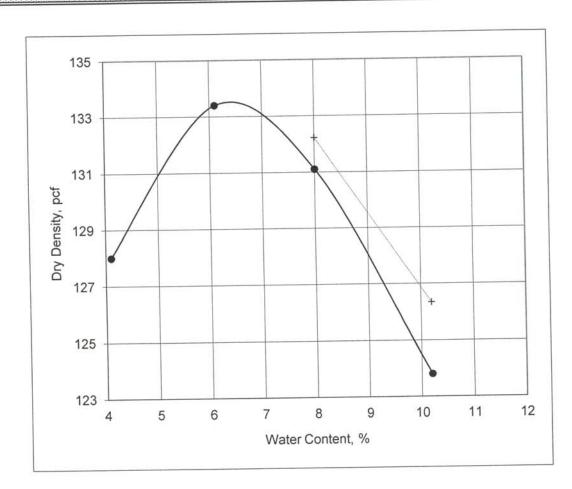
Comments:

Report By: Prav Dayah

PLATE NO: B-9F

RVALUE with calcs pdp

<b>P</b>	LABORATO	ORY CO	MPACTION I	REPORT	(408)-452-9000 Parikh Consultants Inc.
Project:	MINIMUM ARR	A - FUNDE	D SEGMENT - CH	ST Date	: 11/23/11
Client:	AECOM			Project #:	210126.10
Sample #:	S0001A	Depth:	2'-5'	Lab #:	M837
Location/Source:	Fresno / Native			Sample Date:	
Material:	Silty Fine Sand, b	orown		Sampled By:	
************					



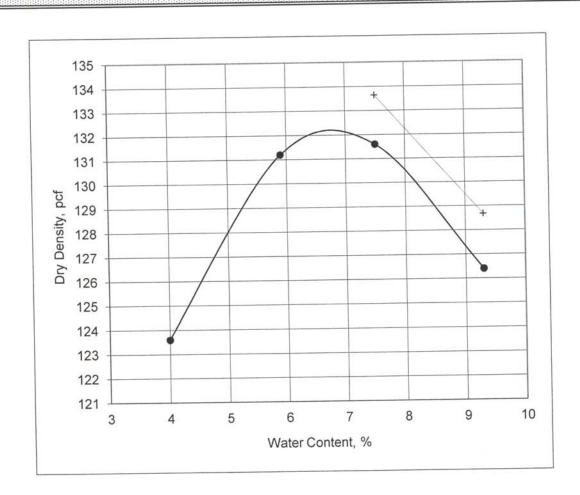
[] D 698	[X] D 1557	Method: [X	]A []B []
rve-Estimated Spec	ific Gravity:	2.55	
Labora	atory Test Results		
1	2	3	4
4.1	6.1	8.0	10.2
128.0	133.4	131.1	123.8
ocf: 133.3	OPTIMUM MO	DISTURE, %:	6.5
	Labora 1 4.1 128.0	Laboratory Test Results	Type-Estimated Specific Gravity: 2.55   Laboratory Test Results   1

Comme	nts
-------	-----

 Report By: Prav D Dayah
 PLATE NO: B-10A

 R340
 rev. 10/08/96

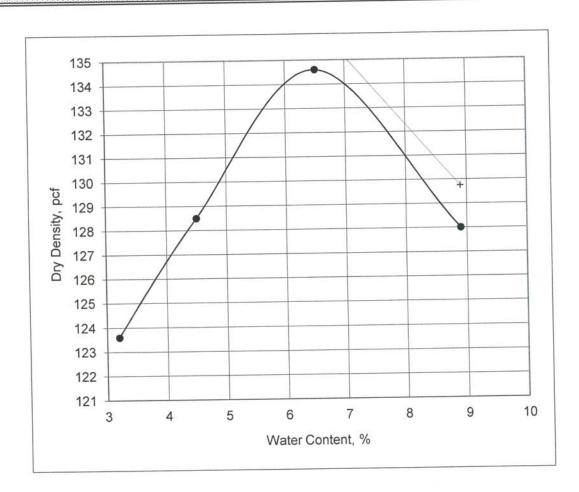
[ <b>[</b> P]	LABORA	TORY CO	MPACTIO	N REPORT	(408)-452-9000 Parikh Consultants Inc.
Project:	MINIMUM A	RRA - FUNDE	D SEGMENT -	CHST Date	: 11/23/2011
Client:	AECOM			Project #:	210126.10
Sample #:	S0002A	Depth:	2'-5'	Lab #:	M837
Location/Source:	Fresno / Nativ	e		Sample Date:	
Material:	Silty Fine San	d, brown		Sampled By:	



ASTM Test Designation: [	] D 698	[X] D 1557	Method: [X	] A [ ] B	[](
100 % Saturation Curve-F	Estimated Spec	cific Gravity:	2.55		
		atory Test Results			_
Trial #	1	2	3	4	
Water Content,%	4.0	5.9	7.5	9.3	
Dry Density, pcf	123.6	131.2	131.6	126.4	

PLATE NO: B-10B Report By: Prav D Dayah

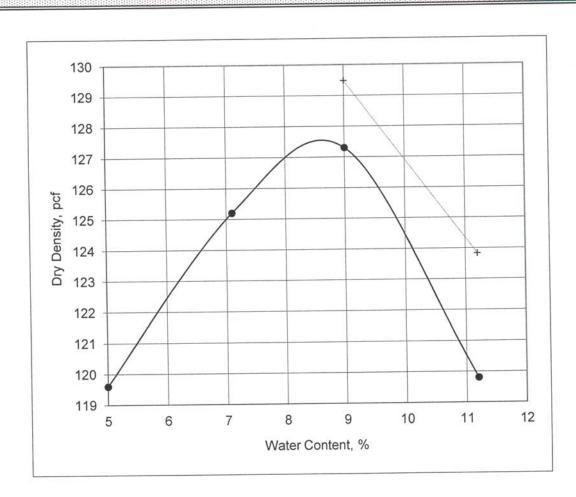
P	LABORATO	ORY COM	1PACTIO1	N REPORT	(408)-452-9000 Parikh Consultants Inc.
Project:	MINIMUM ARR	A - FUNDED	SEGMENT -	CHST Date	: 11/23/2011
Client:	AECOM			Project #:	210126.10
Sample #:	S0003A	Depth:	2'-5'	Lab #:	M837
Location/Source:	Fresno / Native			Sample Date:	
Material:	Silty Fine Sand, b	rown		Sampled By:	



		2.55	
1	2	3	4
3.2	4.5	6.5	8.9
123.6	128.5	134.6	128.0
			8. 8.
	1 3.2	Laboratory Test Results	2.55   Laboratory Test Results   2   3     3.2   4.5     6.5

Report By: Prav D Dayah PLATE NO: B-10C

P	LABORA	TORY CO	MPACTION R	EPORT	(408)-452-9000 Parikh Consultants Inc.
Project:	MINIMUM A	RRA - FUNDE	D SEGMENT - CHS	Γ Date:	11/23/2011
Client:	AECOM			Project #:	210126.10
Sample #:	S0005R	Depth:	2'-5'	Lab #:	M837
Location/Source:	Fresno / Nativ	e		Sample Date:	
Material:	Silty Fine San	d, brown		Sampled By:	

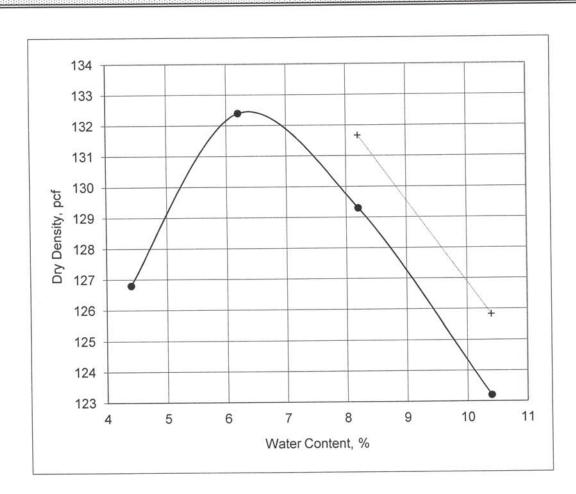


ASTM Test Designation:	[] D 698	[X] D 1557	Method: [X	]A []B []
100 % Saturation Curve-	Estimated Spec	cific Gravity:	2.55	]
	Labor	atory Test Results		
Trial #	1	2	3	4
Water Content,%	5.0	7.1	9.0	11.2
Dry Density, pcf	119.6	125.2	127.3	119.8
		1		
MAXIMUM DRY DENSITY, pcf:	127.5	OPTIMUM MO	DISTURE, %:	8.6

-	
Comment	10
Commen	S.

Report By: Prav D Dayah PLATE NO: B-10D

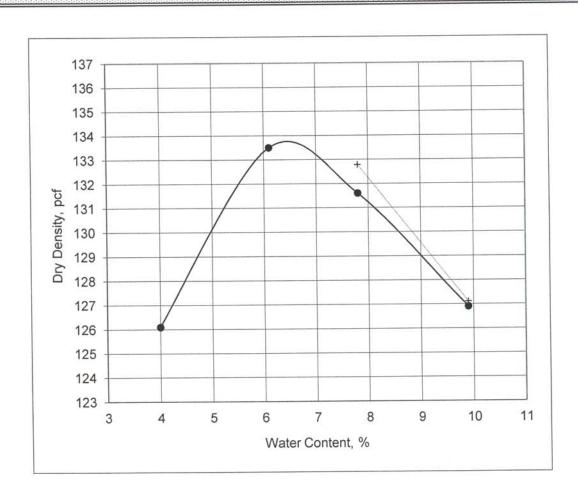
P	LABORA	TORY CO	MPACTION R	EPORT	(408)-452-9000 Parikh Consultants Inc.
Project:	MINIMUM A	RRA - FUNDE	D SEGMENT - CHS	T Date:	12/26/2011
Client:	AECOM			Project #:	210126.10
Sample #:	S0006A	Depth:	2'-5'	Lab #:	M837
Location/Source:	Fresno / Nativ	/e		Sample Date:	
Material:	Silty Fine San	id, brown		Sampled By:	



100 % Saturation Cur	rve-Estimated Spec	ific Gravity:	2.55	
	Labor	atory Test Results		
Trial #	1	2	3	4
Water Content,%	4.4	6.2	8.2	10.4
Dry Density, pcf	126.8	132.4	129.3	123.2
MAXIMUM DRY DENSITY, po	cf: 132.5	OPTIMUM MO		6.4

Report By: Prav D Dayah PLATE NO: B-10E

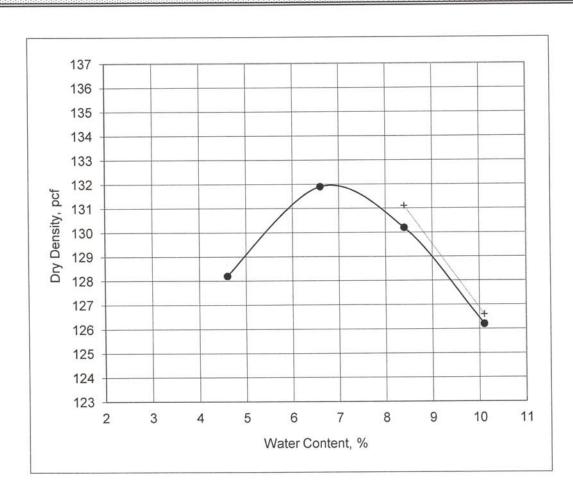
<b>[</b> ]°]	LABORA	TORY CO	MPACTIO	N REPORT	(408)-452-9000 Parikh Consultants Inc.
Project:	MINIMUM A	RRA - FUNDE	D SEGMENT -	CHST Date	e: 11/26/2011
Client:	AECOM			Project #:	210126.10
Sample #:	S0008A	Depth:	2'-5'	Lab #:	M837
Location/Source:	Fresno / Nativ	re		Sample Date:	
Material:	Silty Fine San	d, brown		Sampled By:	



ve-Estimated Spec	ific Gravity:	2.55	
Labora	atory Test Results		
1	2	3	4
4.0	6.1	7.8	9.9
126.1	133.5	131.6	126.9
	1		
	Labora 1 4.0	1 2 4.0 6.1	Laboratory Test Results           1         2         3           4.0         6.1         7.8

Report By: Prav D Dayah PLATE NO: B-10F

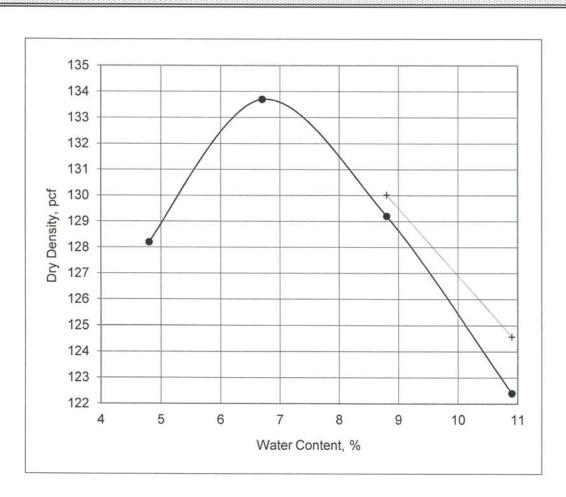
P	LABORA	TORY CO	MPACTION R	EPORT	(408)-452-9000 Parikh Consultants Inc.
Project:	MINIMUM A	RRA - FUNDE	D SEGMENT - CHS	Γ Date	e: 11/27/11
Client:	AECOM			Project #:	210126.10
Sample #:	S0009A	Depth:	2'-5'	Lab #:	M837
Location/Source:	Fresno / Nativ	re		Sample Date:	
Material:	Silty Fine San	d, brown		Sampled By:	



100 % Saturation C	Curve-Estimated Spec	ific Gravity:	2.55	
	Labora	atory Test Results	100-	
Trial #	1	2	3	4
Water Content,%	4.6	6.6	8.4	10.1
Dry Density, pcf	128.2	131.9	130.2	126.2

PLATE NO: B-10G Report By: Prav D Dayah

P	LABORA	TORY CO	MPACTIO	N REPORT	(408)-452-9000 Parikh Consultants Inc.
Project:	MINIMUM A	RRA - FUNDE	D SEGMENT -	- CHST Dat	e: 11/27/11
Client:	AECOM			Project #:	210126.10
Sample #:	S0010A	Depth:	2'-5'	Lab #:	M837
Location/Source:	Fresno / Nativ	e		Sample Date:	
Material:	Silty Fine San	d, brown		Sampled By:	



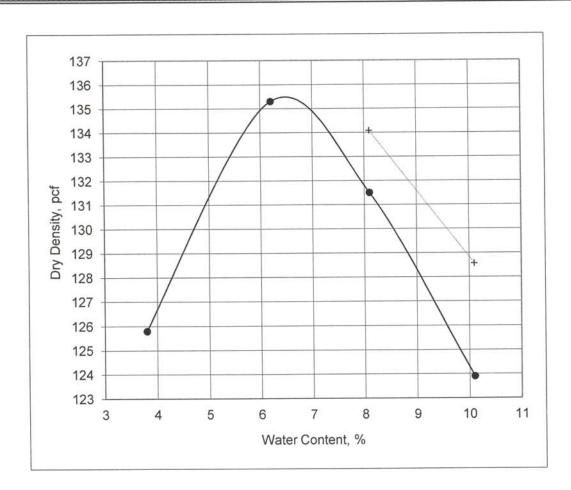
ASTM Test Designation:	[] D 698	[X] D 1557	Method: [X]	A []B [
100 % Saturation Curv			2.55	
	Labor	atory Test Results		
Trial #	1	2	3	4
Water Content,%	4.8	6.7	8.8	10.9
Dry Density, pcf	128.2	133.7	129.2	122.4
		7		
MAXIMUM DRY DENSITY, pcf	133.8	ОРТІМИМ МО	ISTURE, %:	6.8

-					2023
( )	C	ררו	122	OF	its
	v.	ш	111	CI.	нэ

Report By: Prav D Dayah

PLATE NO: B-10H

	LABORA	TORY CO	MPACTIO	N REPORT	(408)-452-9000 Parikh Consultants Inc.
Project:	MINIMUM A	RRA - FUNDE	D SEGMENT -	· CHST Dat	e: 11/27/11
Client:	AECOM			Project #:	210126.10
Sample #:	S0007A	Depth:	2'-5'	Lab #:	M837
Location/Source:	Fresno / Nativ	e		Sample Date:	
Material:	Silty Fine San	d, brown		Sampled By:	

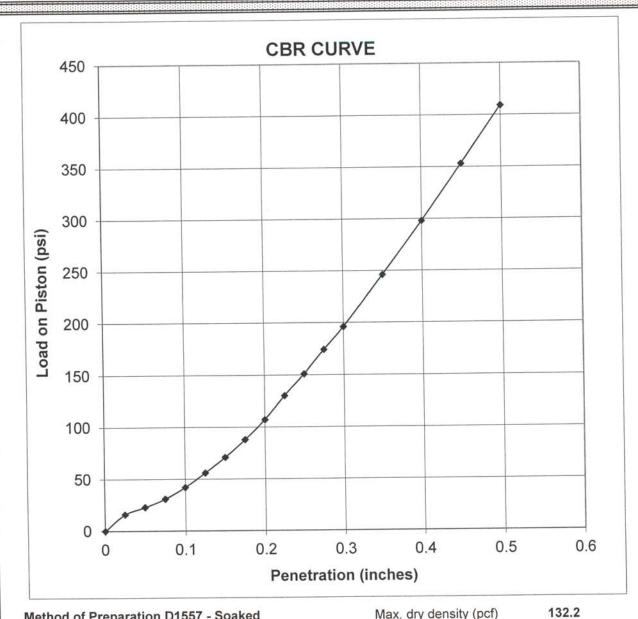


100 % Saturation Cu	% Saturation Curve-Estimated Specific Gravity:			
	Labora	atory Test Results	5	
Trial #	1	2	3	4
Water Content,%	3.8	6.2	8.1	10.1
Dry Density, pcf	125.8	135.3	131.5	123.9
MAXIMUM DRY DENSITY, p	ocf: 135.5	OPTIMUM MO	OISTURE, %:	6.5

C	0	m	m	01	٦t	C
-	v.	ш	111	C1	11	.3

PLATE NO: B-10I Report By: Prav D Dayah

[19]			RNIA BEARING RATIO TM D1883		
Project Name:	MINIMUM	ARRA - FUNDED S	SEGMENT - CHST	Project #:	2009-138-400
Sample #:	S0002A	Depth:		Lab #:	M837
Mat'l Description		Silty Sand, brown		Date	12/7/2011
% Quick Lime (S		None		Tested By	: PDD



Method of Preparation D1557 - Soaked

0.0

Swell %

Before Soak	
Dry Density (pcf)	127.4
% m/c before compaction	9.0
% m/c after compaction	8.8

Surcharge Wt.(lbs)

Max. dry density (pcf) Opt. % m/c 6.8

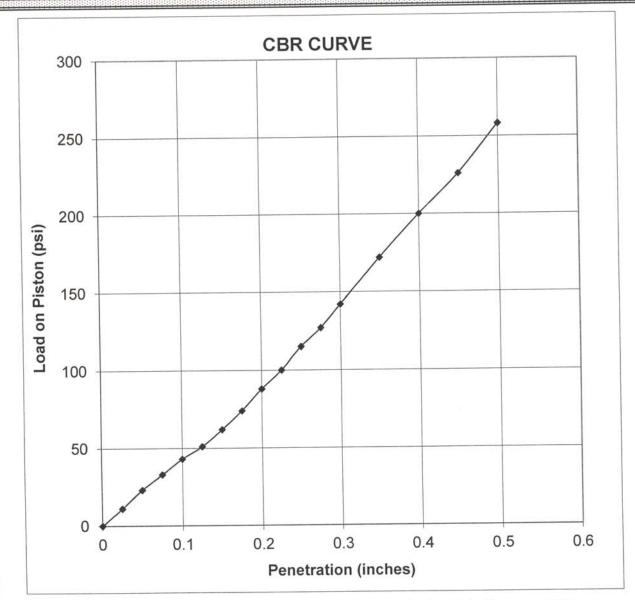
After Soak				
Dry Density (pcf)	127.5			
% m/c top 1"	9.1			
Average	9.1			

CBR VALUE				
.100"	4.2			
.200"	7.1			
PLATE N	O: B-11A			

PARIKH CONSULTANTS, INC.

10

P			RNIA BEARING RATIO		
Project Name:	MINIMUM	ARRA - FUNDED S	SEGMENT - CHST	Project #:	2009-138-400
Sample #:	S0005R	Depth:		Lab #:	M837
Mat'l Description		Silty Sand, brown		Date	12/7/2011
% Quick Lime (		None		Tested By	: PDD



Method of Preparation D1557 - Soaked

Before Soak	
Dry Density (pcf)	122.2
% m/c before compaction	10.9
% m/c after compaction	10.7

Opt. % m/c

Max. dry density (pcf)

127.5 8.6

After Soa	k
Dry Density (pcf)	122.5
% m/c top 1"	11.0
Average	10.8

Swell % 0.0

Surcharge Wt.(lbs)

10

CBR VALUE
.100" 4.3
.200" 5.9
PLATE NO: B-11B

PARIKH CONSULTANTS, INC.

### **APPENDIX D**

## URS/HMM/Arup Joint Venture (URS) GEOTECHNICAL DATA (Field & Laboratory Data only)

(Part of Volume 2 of 2)

#### APPENDIX D

# GEOTECHNICAL DATA WEST CLINTON AVENUE TO EAST AMERICAN AVENUE FRESNO, CALIFORNIA CALIFORNIA HIGH-SPEED TRAIN PROJECT

A geotechnical investigation was performed by URS/HMM/Arup Joint Venture (URS) for the approximately 9 miles of CHST track from West Clinton Avenue to about East American Avenue in Fresno, California (Contract Package 1, Fresno to Bakersfield segment). The proposed alignment includes a combination of at-grade tracks, grade separation structures, overcrossings, undercrossings, and aerial structures. The design requires shallow and deep foundations, deep excavations on the order of 55 feet, retaining walls, and embankments. The final Geotechnical Data Report (GDR) was issued by URS in February 2012.

The field geotechnical investigation was conducted between October 10 and 28, 2011, and consisted of 17 soil borings and 44 Cone Penetration Tests (CPTs). At the completion of drilling, 7 boreholes were converted to standpipe piezometers for long-term groundwater monitoring. In situ testing performed during the field exploration included shear wave velocity measurements in 4 boreholes and 6 CPTs, and pore water pressure dissipation tests in 19 CPTs. A laboratory test program was performed on representative soil samples to obtain index and engineering properties.

The final GDR by URS has been distributed to proper parties by the California High-Speed Rail Authority. The main body of the final GDR and some Appendices (geotechnical data from the field exploration) are attached for easy reference. All descriptions and appendices attached are from the final GDR issued in February 2012 by URS. It should be recognized that the final GDR by URS must be read in its entirety for a comprehensive understanding of the project and findings of the investigation.

#### **ATTACHEMENTS:**

- 1. Final Geotechnical Data Report February 2012 by URS (Main Body)
- 2. Exploratory Borehole Records (Appendix B)
- 3. Cone Penetration Test Records (Appendix C)
- 4. PS Logging Records GEOVision Geophysical Services (Appendix D)

# **Appendix B Exploratory Borehole Records**

For gINT Database, see CD

Table B-1
Summary of Exploratory Borehole Locations, Depths, and In Situ Testing

Borehole ID	Elevation (NAVD88)	Northing (NAD83)	Easting (NAD83)	Continuous Sampling Interval(s)	Total Depth of Drilling	In Situ	Testing
	(ft)	(ft)	(ft)	(ft)	(ft)	PS <sup>[1]</sup>	PZ <sup>[2]</sup>
S0001R	287.40	2,162,577	6,318,315	5 to 15.5	51.5		
S0002R	290.40	2,158,798	6,322,192	5 to 15.5	81.5		
S0003R	288.00	2,157,251	6,323,233	5 to 15.5	82.0		✓
S0004R	283.70	2,156,593	6,324,256	5 to 15.5; 50 to 56	81.5		
S0005R	285.30	2,155,457	6,325,239	5 to 15.5; 45 to 51	95.0	✓	✓
S0006R	287.60	2,154,688	6,325,497	5 to 15.5; 35 to 41	81.5		
S0007R	285.10	2,152,087	6,327,474	5 to 15.5	81.5		
S0010R	286.10	2,150,922	6,328,342	5 to 15.5	165.0	✓	✓
S0012R	287.60	2,148,215	6,330,774	5 to 15.5	165.0	✓	
S0013AR	286.10	2,146,714	6,332,312	5 to 15.5	150.0		✓
S0014AR	285.40	2,143,960	6,334,724	5 to 15.5	81.5		
S0014R	284.60	2,145,253	6,333,705	5 to 15.5	81.5		
S0015R	286.70	2,141,424	6,337,012	5 to 15.5	51.5		
S0016R	288.80	2,138,780	6,338,686	None	160.0		✓
S0017R	290.50	2,136,102	6,340,038	None	151.5		✓
S0018R	305.80	2,134,428	6,340,369	None	165.0	✓	✓
S0019R	292.50	2,125,499	6,341,566	5 to 15.5	51.5		

<sup>&</sup>lt;sup>[1]</sup> PS: P- and s-wave suspension velocity logging

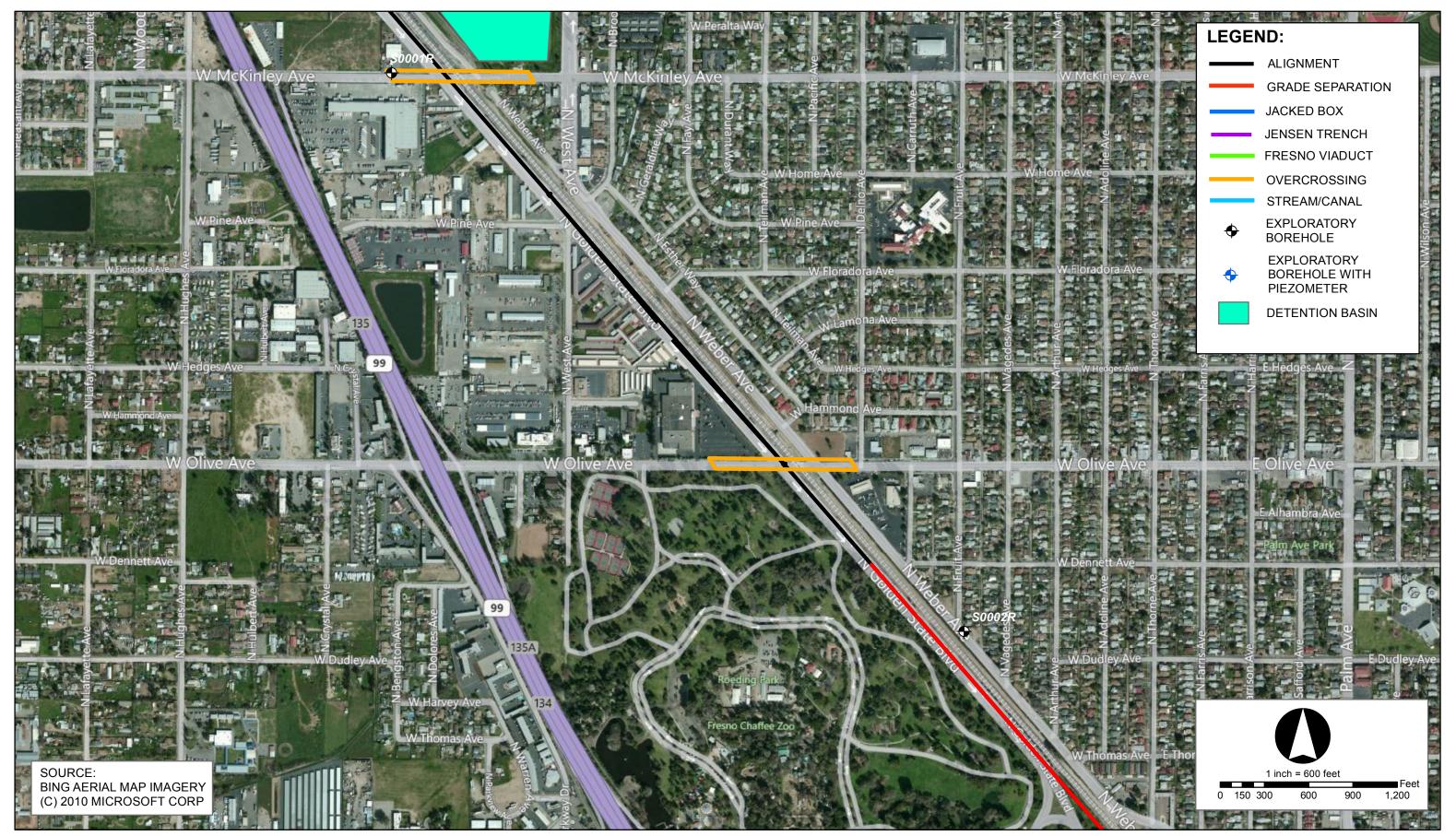
<sup>[2]</sup> PZ: standpipe piezometer





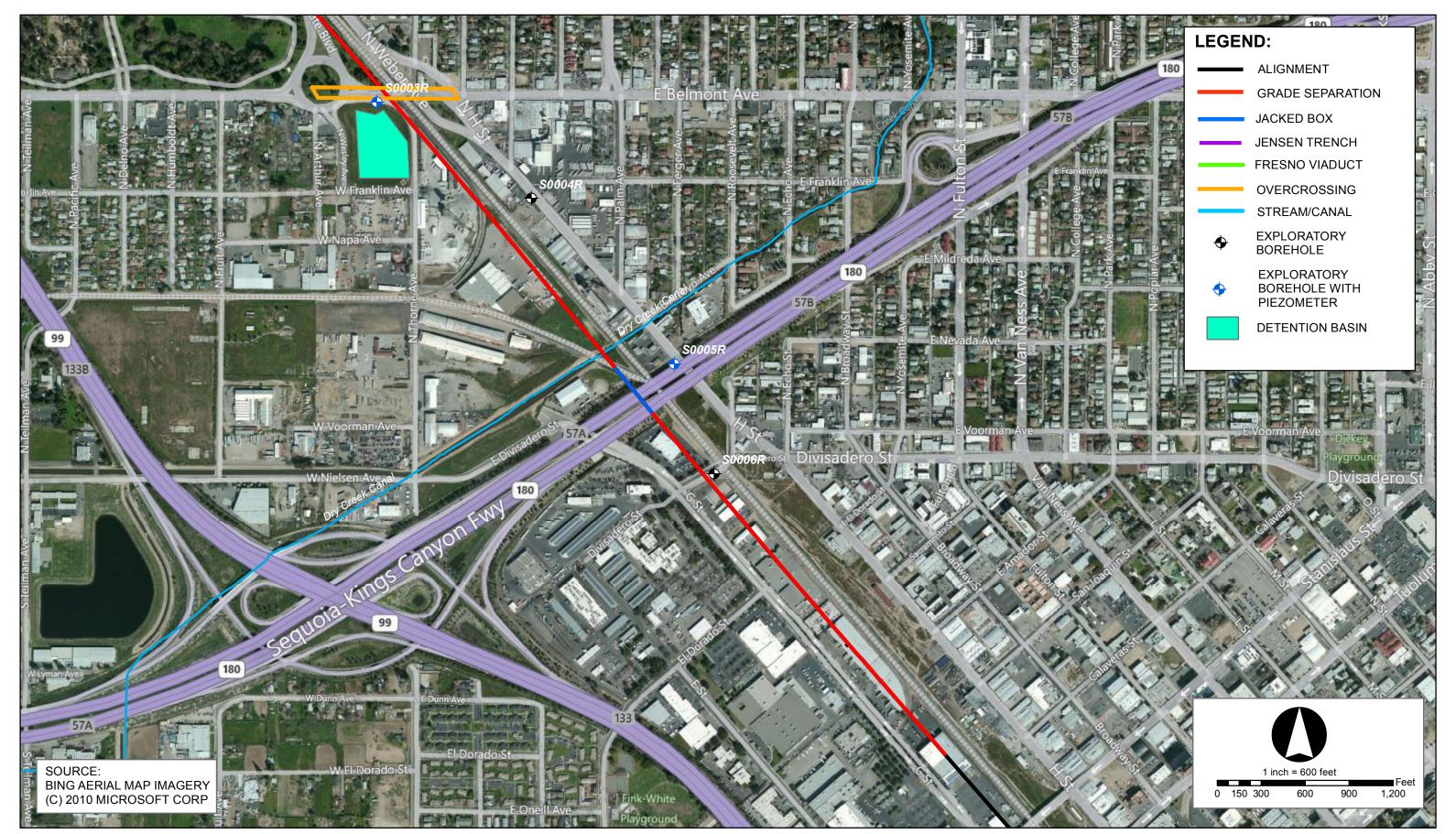


EXPLORATORY BOREHOLE LOCATION INDEX SHEET
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 1



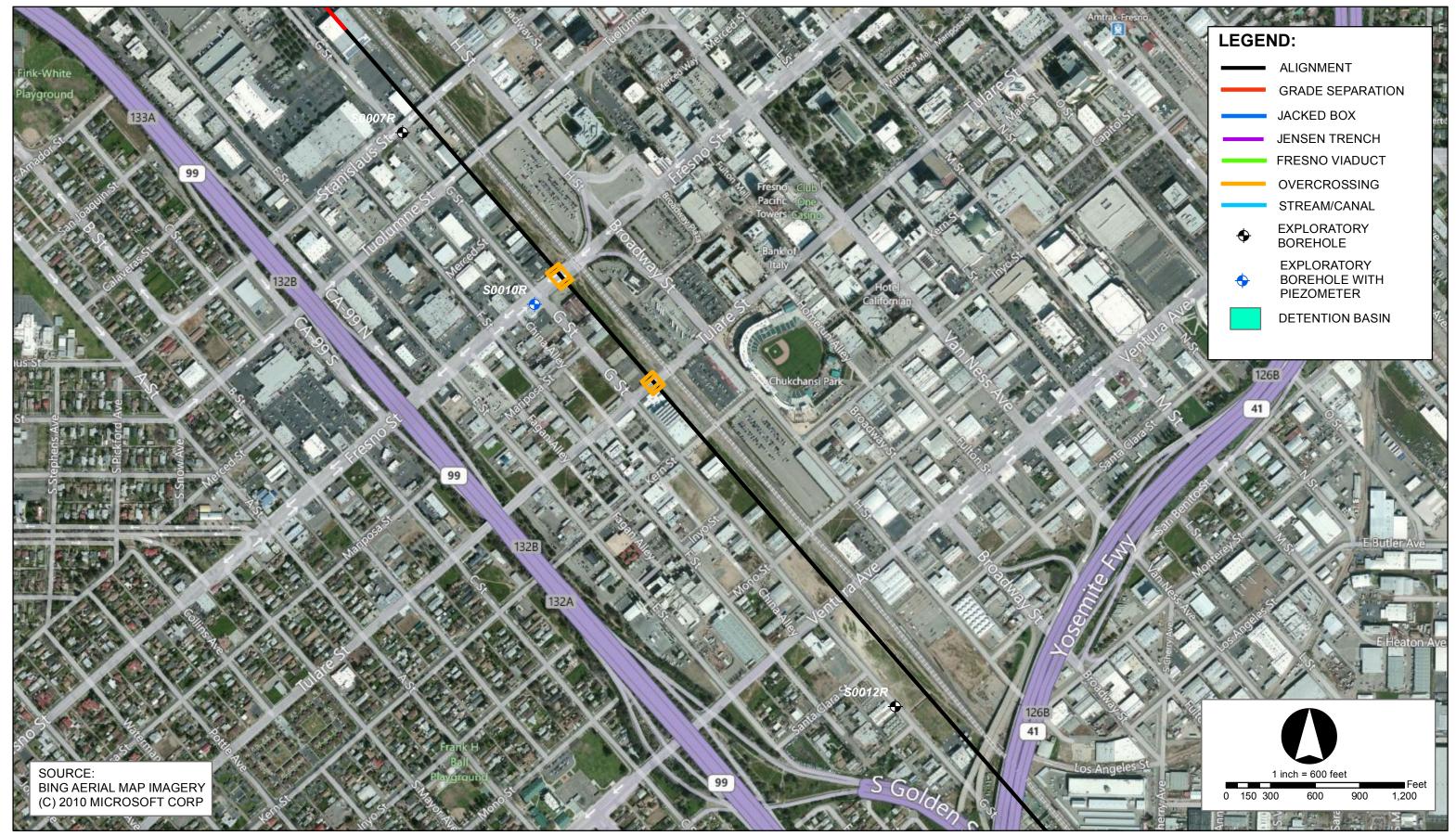








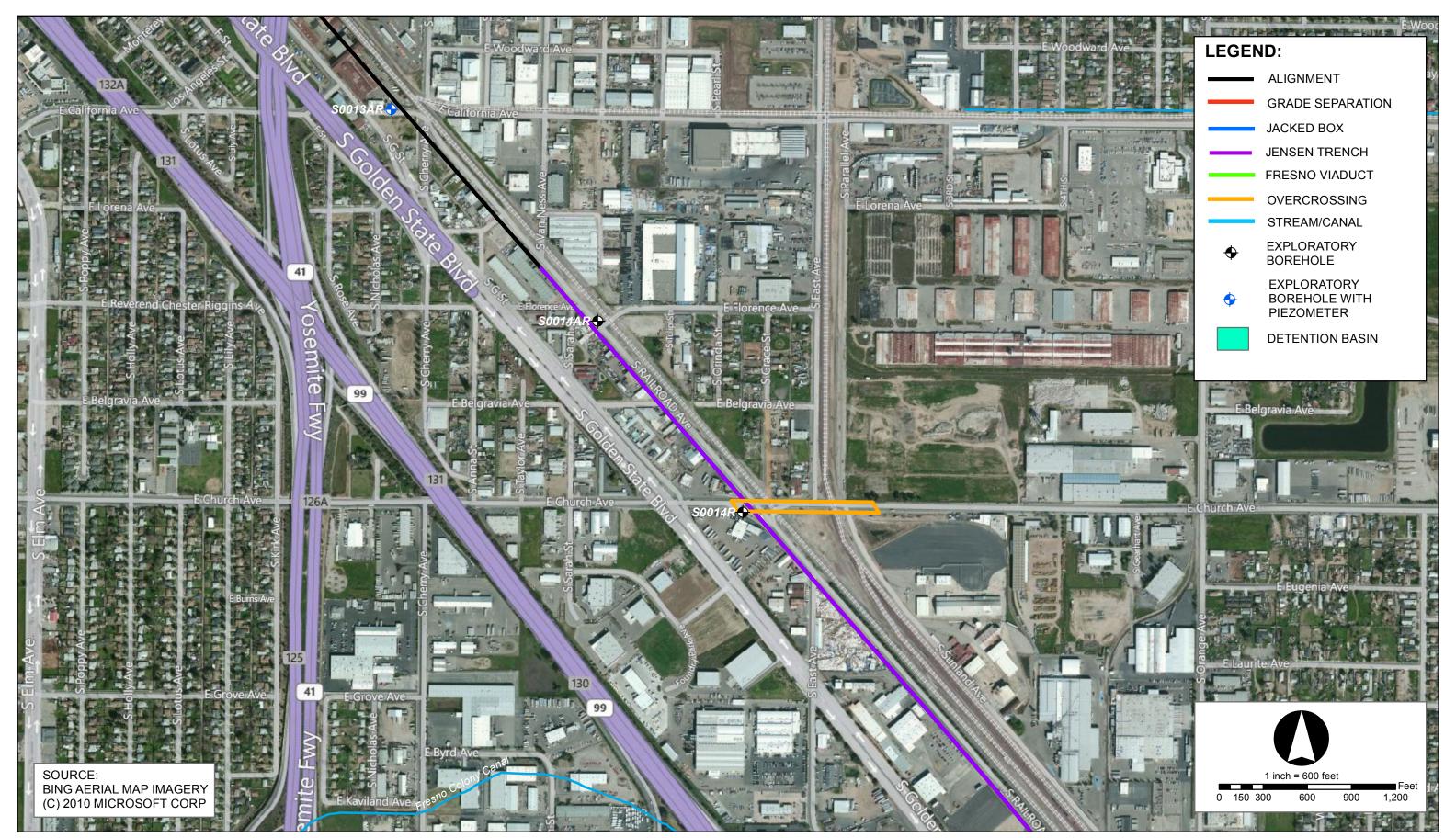








EXPLORATORY BOREHOLE LOCATION PLAN
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 1









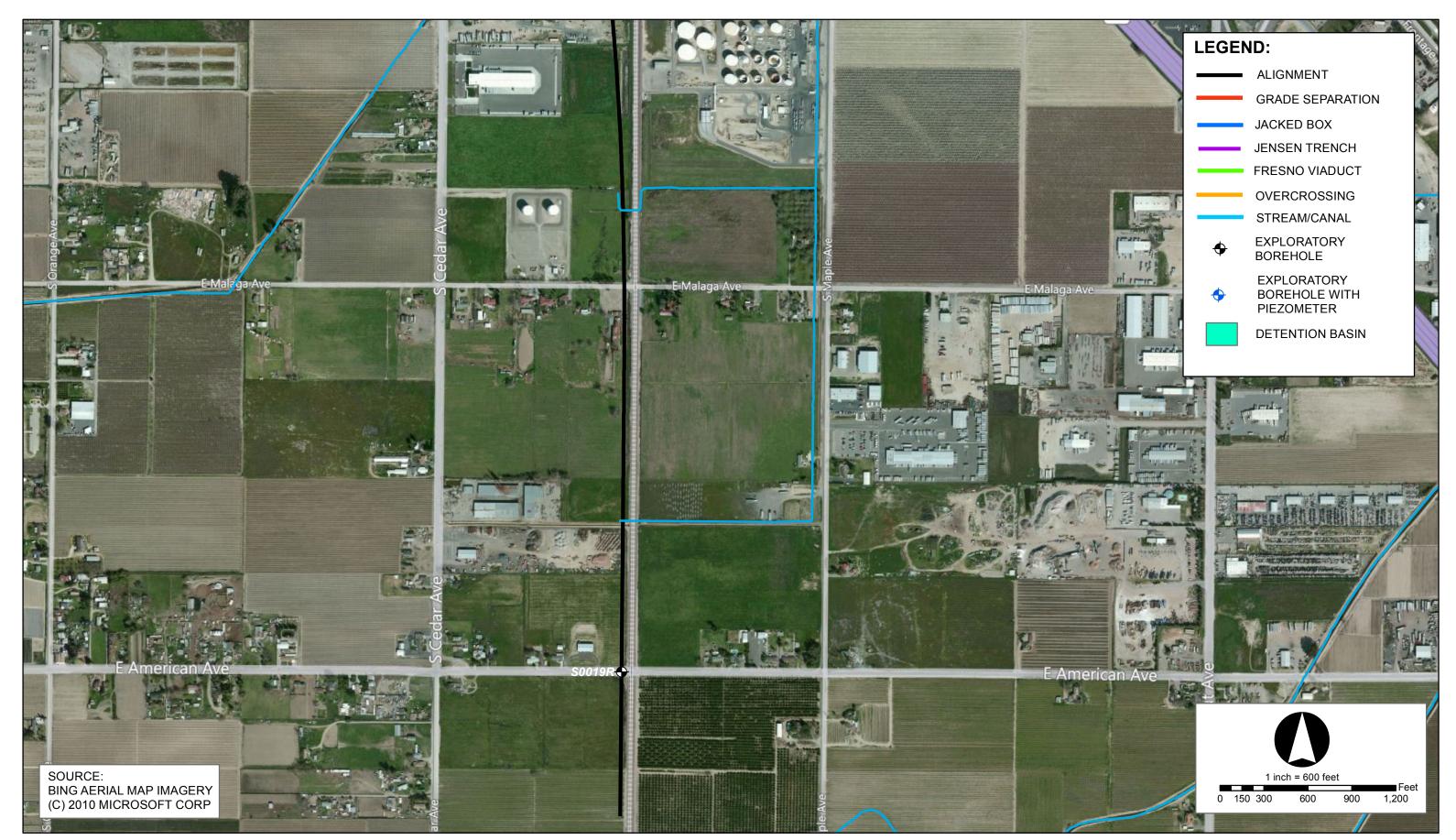












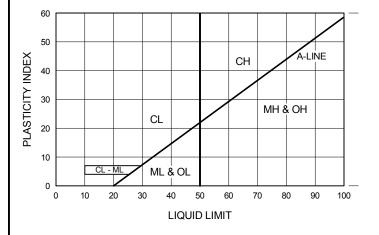




#### **INDEXED SOIL CLASSIFICATIONS**

GRAPHIC	SYMBOL	DESCRIPTION		MAJOR DIV	SIONS	}	
	GW	WELL-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	CLEAN GRAVELS	: OF N IS D.4	4Y BE		
	GP	POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	(LITTLE OR NO FINES)	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO.4 SIEVE SIZE	FOR VISUAL CLASSIFICATION, THE 1/4" SIZE MAY BI USED AS EQUIVALENT TO THE NO.4 SIEVE SIZE	S IZE	
	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES	GRAVELS WITH FINES	GRAY RETHA RRSEFF RGERT SIEVE	HE 1/4".	COARSE-GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN NO.200 SIEVE SIZE	
	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES	( APPRECIABLE AMOUNT OF FINES )	MOI COA	TON, T	AINEL F OF MA O.200 S	THE EYE
	SW	WELL-GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES	CLEAN SANDS	- OF N IS 10.4	SIFICAT	E-GR NN HALI	THE NO.200 U.S. STANDARD SIEVE IS ABOUT THE SMALLEST PARTICLE VISIBLE TO THE NAKED EYE
	SP	POORLY-GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES	(LITTLE OR NO FINES)	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO.4 SIEVE SIZE	- CLAS; EQUIV,	OARS RETHA	SVE IS A
	SM	SILTY SANDS, SAND-SILT MIXTURES	SANDS WITH FINES	SAI RE THA ARSE FI ALLER SIEVE	VISUAI SED AS	<b>o</b> § ₹	ARD SIE
	sc	CLAYEY SANDS, SAND-CLAY MIXTURES	( APPRECIABLE AMOUNT OF FINES )	MOI COA SM,	AO.		STANDA
	ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY				AL IS SIZE	0 U.S. S PARTIC
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS		& CLAYS LESS THAN 50		ED SOILS OF MATERIAL 0.200 SIEVE SI	NO.20
	OL	ORGANIC SILTS AND ORGANIC SILT-CLAYS OF LOW PLASTICITY				NED S - OF M/	THE
	МН	ORGANIC SILTS AND ORGANIC SILT-CLAYS OF HIGH PLASTICITY				FINE-GRAINED ( MORE THAN HALF OF M SMALLER THAN NO.200	
	СН	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS		& CLAYS REATER THAN 5	0	FINE. RETHA	
	ОН	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS				MO SM/k	
7 7 7 7 7 7 7 7 7	PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	Н	GHLY ORGAN	NIC SOI	LS	
	os	OILY SEDIMENTS					





#### **KEY TO TEST DATA**

TV = POCKET TORVANE
PP = POCKET PENETROMETER

#### **KEY TO SAMPLER TYPE**

BULK

SPT = STANDARD PENETRATION TEST SAMPLER





SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

	ECT NA		h-Speed Train Fre	eno to Bakerefi	ماط													ROJEC		MBER	
LOGG	ED BY Poling	ıııg	BEGIN DATE Oct-10-11	COMPLETION DA	TE BORI				ATION (La 2 / E631								Н	OLE IE	)		
		NTR/	ACTOR/DRILLER	OCI-11-11	IN-SI				2 / E03	10316	0.078	) (IV	ialioi	iai G	iiu)			SOO( JRFAG		EVATION	
	her/O.				55"		_										_		`	NAVD88)	
	ING ME GER(0		) , MUD ROTARY(14	l'-51.5')	DRILI Fai			00										)REH 1.875		DIAMETER	
			AND SIZE(S) (ID)						PE/HAMM 0 lbs, 30			<u> </u>						AMME	R EFI	FICIENCY, ERI	
	Γ(1-3/8 HOLE E		FILL AND COMPLETION						DURING			•	FTER	DRIL	LING (	(DATE			DEPT	H OF BORING	
Nea	t ceme	ent g	rout		REAL	OING	S		13.5 ft (10	0/10/20	11)		N	ot Rec	orded		5	1.5 f	t	ı	$\vdash$
Elevation (ft)	o Depth (ft)	Material Graphics		Description		Sample Location		Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method		
			ASPHALT (4") (AC). SILTY SAND (SM); bro subangular GRAVEL; t		; trace fine	00000000000000	S01	0			60	60	31.9							Hand auger to $5.0^{\circ}$ Modified Proctor: Max $\gamma_d = 136.6$ pcf mum $W_1 = 6.4\%$	
			SILTY SAND (SM); me dry; fine to medium; litt			000		5													
282.44	1 7		[ALLUVIUM].			X	S02	5	33-16-16	32	18	6							}		Ħ
	=							6.5											}		H
							S03	6.5	10-11-14	25	18	18							$ \{$		
						X		8					21.2						$ \{J\} $		H
			Poorly graded SAND w to dry; fine; few SILT; v		own; moist	M	S04	9.5	10-10-10	20	18	18	8.7							Installed 8.5' of 5" casing	
277.44			9.5', grades to reddish	brown; moist; some	SILT.		S05	9.5	9-7-7	14	18	18							}		
			10.5', grades yellowish	brown: trace fines.		X		11													E
			SANDY SILT (ML); ver	ry stiff; reddish brown	; wet; some	1	S06	11	16-11-12	23	18	18	69.4								Ħ
	=		SAND; weak cementat	ion.		X		12.5													Ħ
0/12	▎∄		SILTY SAND (SM); de to dry; fine; some SILT		own; moist		S07	12.5	19-23-17	40	18	18							}		
B 2/2	1		,	,		$\Lambda$		14					40.4/ 32.4						{{	Driller measures	
RY.GL	15		14.0', medium dense; I GRAVEL; fine to coars			V	S08	14	3-4-14	18	18	18	JZ.4							water level at 13.5' Switch to mud	H
272.44	15		·	,		$\Lambda$		15.5					35.2							rotary at 14.0' (4.875" tricone	Ħ
OTRI																				bit)	
RUP [																					
PJ A																			000		H
F-B.C																			<u> </u>		
CHSR																					Ħ
1.0.3 BOREHOLE LOG - CHSTP F-B CHSR_F-B.GPJ ARUP DOTR LIBRARY.GLB 2/20/12  2.2  4.4  4.7  4.7  4.7  4.7  4.7  4.	20																				E
19 19 19 19 19 19 19 19 19 19 19 19 19 1			(continue	ed)																	
96-6									REPORT :		CO	RD								OLE ID 80001R	
OLE L									DIST.	_	JNTY		RO	UTE	P	POSTN	/ILE		E		
NEH SKEH		A	LIFORNIA	URS H	MM ARUP				PROJECT Californ					rain	-						
.0.3 B(	Н	igh-	Speed Rail Autho	rity	RNA HIGH-SPEED	TRAIN			BRIDGE N			PF	REPAR	RED B ggi/T		ırran		DA <sup>1</sup>	TE 20-1	SHEET 2 1 of 3	
<del>-</del> ∟								1_				⊥י	. ivid	99" I	. <b>U</b> u	iiiall			_0-1	_ 1 01 0	

Californ	NAME ia High	n-Speed Train Fre	esno to Bakersfield	DOD	-1101	1.00	ATION (L	-4/1	N	l4l- /		D	4		_   1	3157		
LOGGED B' A. Poling		BEGIN DATE Oct-10-11	COMPLETION DATE Oct-11-11	BORI N2	-ноце 16257	77.13	ATION (La 2 / E631	at/Long 1831	or N 5.07	orth/ 9 (N	⊨ast a <mark>\atio</mark> r	nd Da nal G	rid)			OLE ID		
DRILLING C		CTOR/DRILLER		IN-SI	TU TE	STING									SI	JRFAC	E ELE	EVATION
DRILLING N	•			DRIL	L RIG												•	NAVD88) IAMETER
AUGER(	0'-14'),	MUD ROTARY(14	1'-51.5')	Fai	ling 1											1.875	in	
SAMPLER 1 SPT(1-3/		AND SIZE(S) (ID)					PE/HAMN 0 lbs, 3			op						AMMEI 38%	R EFF	ICIENCY, ERI
BOREHOLE	BACKF	LL AND COMPLETION	I	GRO	UNDW		DURIN	G DRII	LLINC	•	AFTER	DRIL	LING	(DATE	E) T(	OTAL [		OF BORING
Neat cen	nent gr	out		REAL	DINGS		13.5 ft (1	0/10/20	D11)		N	ot Rec	orded		5	1.5 ft	: 	
Elevation (ft)	Material Graphics		Description			Sample Number Sample Depth (ft)		N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
		SANDY SILT (ML); hai mottled red; wet; some cementation.	rd; dark yellowish brown w e SAND; low plasticity; wea	ith ak	S	21.5		75	18	16	63.7		21	3	1.4		<u> </u>	
262.44 25		SANDY SILTY CLAY (fine SAND.	CL-ML); hard; brown; wet	; some	s	26.5		44	18	12	50.7	13.1	18	4	2.4		<u>OUTOTOTOTOTOTOTOTOTOTOTOTOTOTOTOTOTOTOT</u>	
257.44 30		SILTY SAND (SM); de fine to medium; little S	nse; dark yellowish brown ILT; weak cementation.	; wet;	s	31.5		36	18	16	28.9							
252.44 35		reddish brown; wet; fin Poorly-graded SAND (	ense; mottled grayish brown ne; little SILT; weak cemer SP); dense; mottled grayis wn; wet; fine; trace SILT;	tation sh	s	35 36.5		49	18	12							<u> </u>	
247.44—40—		(continue	ed)															
							REPORT BORIN DIST.	G RI				UTE	F	POSTN	MILE			DLE ID 0001R
	CAL	.IFORNIA	URS HMM	ARUP			PROJECT					'ne!						
	Hiah-S	peed Rail Autho	rity CALFORNA H	IGH - SPEED	TRAN		Califorr BRIDGE 1				ed I Repai					DAT	_	SHEET

DREHCKEN 2162 - SITU   SITU   RILL RILL RILL RILL RILL RILL RILL RI	257 TES RIG 1: RIG 1: RIG MMIn DWS Salinius Number S1	7.13 TING 500 ER TY Cc, 14 ATER (#) Had Delaws 3 41.	2 / E PE/H. O lbs DUI 13.5 1	AMME S, 30-	ER ID	5.079 h dro	9 (N op	Vatio (%) AFTER (%)	Moisture Content (%) Moisture Content (%)	LING (%) Imid Finding	(%) National Index (%)	SU 22 BO 24 H/4 (E) TO	287.4 OREH 4.875 AMME 68% OTAL I 51.5 f	O1R CE ELE 4 ft (N OLE DI. 5 in ER EFFI	EVATION NAVD88) IAMETER ICIENCY, ERI H OF BORING Remarks/ Other Tests
SITU TRILL RI RILL RI	TEST STATE OF THE	600 ER TY (1) Had Q aloum 80 3 40 41.	PE/H/- O lbs DUI 13.5 t	AMME	ER IDI-inchi DRILL (10/20 (1/10/20	h dro	Op (ii) A	0.1 (%)	Moisture Content (%) and D	LiUNG (%)	Plasticity Index (%)	SI 2 B( 2 H/ ( %) Solution ( %) Outburner ( %)	URFAC 287.4 OREH 4.875 AMME 68% OTAL I	DEPTH  The polyment of the pol	NAVD88) IAMETER ICIENCY, ERI
Failing PT HAM Autom ROUNIT HAM Autom ROUNIT HAM ROUNIT HAN ROUNIT HAM ROUNIT HAN ROUNIT HAM ROUNIT HAM ROUNIT HAM ROUNIT HAM ROUNIT HAM ROUNIT HAN ROUNIT HAN ROUNIT HAN ROUNIT HAN ROUNIT HAM ROUNIT HAM ROUNIT	g 19 MMinatin DWS Sample Cocanon S S 1	ER TYC, 14 CC, 14 ATER  (1) the old plane of the old plan	O lbs DUI 13.5 1	S, 30-28 (10/2)	I-inch DRILL 1/10/20 41	h dro	The Recovery (in)	0.1 Co Mash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	BG 2 H. (%) Solution (%)	OREH 4.875 AMME 68% OTAL I 51.5 f	OLE DI.  in  R EFFI  casing Debth  ft	ICIENCY, ERI
Failing PT HAM Autom ROUNIT HAM Autom ROUNIT HAM ROUNIT HAN ROUNIT HAM ROUNIT HAN ROUNIT HAM ROUNIT HAM ROUNIT HAM ROUNIT HAM ROUNIT HAM ROUNIT HAN ROUNIT HAN ROUNIT HAN ROUNIT HAN ROUNIT HAM ROUNIT HAM ROUNIT	g 19 MMinatin DWS Sample Cocanon S S 1	ER TYC, 14 CC, 14 ATER  (1) the old plane of the old plan	O lbs DUI 13.5 1	S, 30-28 (10/2)	I-inch DRILL 1/10/20 41	h dro	The Recovery (in)	0.1 Co Mash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	4.875 AMME 68% OTAL I 51.5 f	Drilling Method State Casing Depth t	ICIENCY, ERI
Autom ROUNIC READING	nati DW. Sample Cocanon Sample Cocanon Sample Sample Number Sample Number Sample Sampl	C, 14 ATER (I) Ipage and a second and a second a	O lbs DUI 13.5 1	S, 30-28 (10/2)	I-inch DRILL 1/10/20 41	h dro	The Recovery (in)	0.1 Co Mash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	68% OTAL I 51.5 f	Drilling Method Had Casing Depth H	OF BORING
ROUNIC CONTROL	DWS Sample Cocation S	(1) the department of the depa	DUI 13.5 1	CII o 1990 9990019	DRILL (110/20 (pl/tf) (110/20 (pl/tf) (110/20 (pl/tf)	Dill)  8 Penetration (in)	The Recovery (in)	0.1 Co Mash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	OTAL I	Drilling Method Casing Depth	
Sample location	G Sample Location	(#) utage a plant with the state of the stat	13.5 f	ft (10/	/10/20 (J/JJ) (J	11) 8B Penetration (in)	TRecovery (in)	0.1 Co Mash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	51.5 f	Drilling Method Casing Depth	
	S1	41. 41. 44. 46.	21-1	7-24	41	18	14	0.1					Shear Strength (tsf)		Remarks/ Other Tests
	S1	41. 41. 44. 46.	21-1	7-24	41	18	14	0.1					Shear Strength (ts		Remarks/ Other Tests
	S1	41.	8-15					0.1	31.9	37	14	2.9		000000000000000000000000000000000000000	
		46.		5-50	65	18	18	97.2	31.9	37	14	2.9	-		
	/S1	5 50													
	$\setminus$	3 30	28-3	31-47	78	18	15								
		51.	5					90.2	22.8	26	5	1.2			
4															
1.															
es or															
		-	DESC	.DT T	·									1	N.E.ID
							<u>R</u> D								0001R
		Ī							UTE	ı	POSTI	MILE		EA	2
		+					CE N								
			Calif	rorni	ı a Hi				r ·						
	P	P	P	BOF DIST.	BORINO DIST.  PROJECT	BORING REDIST. COL	DIST. COUNTY	BORING RECORD DIST. COUNTY	BORING RECORD DIST. COUNTY RO	BORING RECORD DIST. COUNTY ROUTE	BORING RECORD DIST. COUNTY ROUTE PROJECT OR BRIDGE NAME	BORING RECORD DIST. COUNTY ROUTE POSTI PROJECT OR BRIDGE NAME	BORING RECORD  DIST. COUNTY ROUTE POSTMILE	BORING RECORD  DIST. COUNTY ROUTE POSTMILE  PROJECT OR BRIDGE NAME	BORING RECORD SO DIST. COUNTY ROUTE POSTMILE EA

PROJECT NAME  California High	n-Speed Train Fresno to Bakersfield	d	-1101 =		TIC:: "								1	3157	77-00	MBER )		
OGGED BY  N. Goodenow	BEGIN DATE COMPLETION DATE Oct-12-11 Oct-13-11				TION (La 7 / E632								5	OLE 10	)2R			
ORILLING CONTRA Gregg/D. Selde		IN-SI	TU TES	TING												EVATION NAVD88)		
ORILLING METHOD		DRILI		<u> </u>									В	BOREHOLE DIAMETER 3.75 in HAMMER EFFICIENCY, ERI				
SAMPLER TYPE(S)	, ROTARY(5.5'-81.5') AND SIZE(S) (ID)		OII B-8		PE/HAMN	IER ID	)						_					
SPT(1-3/8")				•	0 lbs, 30			•					8	38%				
Neat cement gr	LL AND COMPLETION out		JNDWA INGS	IER	DURING Not Re			. Α		R DRIL ot Rec		•	1	31.5 f		H OF BORING		
ø				(1)						t (%)		(%)		tsf)				
Elevation (ft) Depth (ft) Material Graphics	Description		Sample Location Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests		
	ASPHALT (6") (AC). AGGREGATE BASE (6") (AB).		S01	0			60	60										
	SILTY SAND (SM); reddish brown; moist; fine; SILT; trace GRAVEL; rapid dilatancy; [FILL].	little	10.00															
			202												}			
			200						23.8									
			0.00															
285.41 5			0.00	5														
505.41	Poorly graded SAND (SP); reddish brown; mois	st; fine.	S02	5	3-3-4	7	18	16								5.0', Began using mud rotary		
			Δ.	6.5					19.5	3.9					000			
	SILTY SAND (SM); very dense; reddish brown; fine; slow dilatancy; calcite seams [ALLUVIUM]	<u>.                                    </u>	NS03	6.5	4-25-47	72	18	16							<u> </u>			
	Poorly graded SAND with SILT (SP-SM); very of reddish brown; moist; fine; few SILT.		// 804	8	29-52-50	102/	16	16							2000			
	SILTY SAND (SM); very dense; reddish brown; to wet; fine; some SILT.	moist		9.5	23-32-30	9.75"	10	10	42.3/	10.5								
280.41	SILTY SAND (SM); very dense; reddish brown; fine; little SILT.	wet;	S05	9.5	36-43-22	65	18	16	29	15.1								
	11.0', grades brown.		Soc		8-16-41	57	18	13	_						$\triangleright$			
	Becomes less cemented. Cementation ends a Calcite seams end.	t 11.9'.		12.5														
	Poorly-graded SAND (SP); medium dense; gra brown; wet; fine to medium; trace SILT; weak	yish	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	12.5	12-15-13	28	18	13							000			
	cementation. Calcite seams in the top 4".			14	6740	47	40	4.4							<u> </u>			
75 44 45	14.0', grades mostly medium-grained; subround white calcite seams; primarily quartz and musc		Sos		6-7-10	17	18	14	2.8						<u> </u>			
15—				15.5											<u> </u>			
															<u> </u>			
															1000			
															<u> </u>			
															<u>)))))</u>			
270.41 20	(continued)															l		
	<u> </u>				REPORT BORING		 	RD								OLE ID 60002R		
					DIST.		JNTY			UTE	F	POSTN	ЛILE		E/			
CAI		F	PROJECT Californ	OR B	RIDO	SE N	AME	rain										
	peed Rail Authority				oaiii0iT	на ПI	ull-	ove	eu l	ıdıll								

	ECT NA		h-Speed Train I	Fresno to Bakersfie	eld													ROJEC		MBER )
LOGG	ED BY	_	BEGIN DATE Oct-12-11	COMPLETION DAT Oct-13-11	E BOR	EHC	DLE L	OCA	TION (La 7 / E632	t/Long	or N	lorth/	East a	ind Da	tum)		Н	OLE 10	)	-
DRILL	ING CO	NTRA	CTOR/DRILLER	000 10 11	IN-SI					2102		. (.	1000	iui O	110)		SI	JRFA	CE EL	EVATION
	gg/D. S ING ME				DRIL	I DI	C										_			NAVD88) DIAMETER
			), ROTARY(5.5'-	81.5')			B-80	)										3.75 i		DIAIVIETER
			AND SIZE(S) (ID)		I .				PE/HAMN 0 lbs, 30			าก						AMME 38%	REF	FICIENCY, ERI
	(1-3/8 HOLE E		FILL AND COMPLET	ION					DURING				FTER	RDRIL	LING	(DATE			DEPT	H OF BORING
Nea	t ceme	ent gi	rout		REA	OINC	GS		Not Re	corde	t		N	ot Rec	orded		E	31.5 f	t	
		တ္တ				_		æ.						Moisture Content (%)		(%)		(tsf)		
(£)		aphic				catio	mbe	) htt	e ii.	£	(in)	i.	(%)	onter	t (%)	yapı	<u>@</u>	ngth	thod	
Elevation (ft)	h (ft)	ial G				le Lo	le R	le De	ber s	q) ən	tration	very (	Vash	ure C	E.	city II	) soir	- Stre	g Me	
Eleva	Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moist	Liquid Limit (%)	Plasticity Index	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
	20		Poorly graded SAN fine; few SILT; wea	D (SP); dense; grayish bro	own; wet;	V	S09	_	21-18-14	_	18	14	.,	_				0,		
	=		line, lew SiLT, wea	k cementation.		$\Lambda$		21.5					3.5	14.8						
	_∃:																			
																			<u> </u>	
	=																			
	25																			
265.41	25		SILTY SAND (SM);	medium dense; grayish b	prown; wet;	$\overline{}$	S10	25	6-8-9	17	18	14								
	=		ille to coarse, little	OILT, Weak Cernentation.		$\Lambda$		26.5					15.7							
	∄																			
	=======================================																			
	=																			
	=																			29.0', mud rotary
	30																			29.0', mud rotary is much harder to drill
260.41	30		SILTY SAND (SM);	dense; olive brown; wet;	fine; little	$ \bigvee$	S11	30	18-21-21	42	18	16								
	=		oxidation partings.	ation, request readion biv	JWI I	Λ		31.5					43.5/ 45.6	15						
	3												45.0							
	=																			
255.41	35		SILT (ML); stiff to h	ard; olive brown; wet; fine	; few	$ \bigvee$	S12	35	16-24-36	60	18	17								PP: 1.25 tsf TV: 1.2 tsf
	=		s. a.t.s., iotr piaduoit	<i>,</i> -		Ŋ		36.5					86.4	28.6	32	3	2.2	1	200000000000000000000000000000000000000	PP: 1.25 tsf TV: 1.2 tsf
							1													
	Ξ																			
	$\exists$																			
255.41 -250.41	Ξ																			
<b>-</b> 250.41	<b>-</b> 40		(conti	nued)			1	-	1			-	1					-		
			•						REPORT		-00									OLE ID
									BORIN DIST.		CO JNTY			UTE	F	POSTN	ЛILE		E	60002R A
(	<b>a</b> (	Δ'	LIFORNIA	LIRS HM	M ARUP			-	PROJECT	ORR	RIDG	3F N	AMF							
			Speed Rail Aut		NA HIGH-SPEED	TRAN			Californ	nia Hi	gh-	Spe	ed T		· ·			D.4-		CUEET
•	- "	9""	Pood Rull Au						BRIDGE N	NOMBE	:K			RED B ggi/7		ırran		DA <sup>2</sup>	1E 20-1:	SHEET 2 of 5

	ECT NA		h-Speed Train Fre	sno to Bakersfiel	d														77-00	MBER 1	
LOGG	ED BY	•	BEGIN DATE	COMPLETION DATE	BOR				ATION (La								Н	OLE IE	)		
	Sooder		Oct-12-11 CTOR/DRILLER	Oct-13-11	IN-SI				7 / E632	<u> </u>	∠.U9 <sup>*</sup>	1 (1)	valiOľ	ial G	iiu)				02R CE EL	EVATION	_
	gg/D. S																2	290.4	1 ft (	NAVD88)	
	ING ME SER(0		) ), ROTARY(5.5'-81.	5')	DRIL Mo			)										OREH 3.75 i		DIAMETER	
SAMP	LER TY	PE(S)	AND SIZE(S) (ID)	,					PE/HAMN								H	AMME		FICIENCY, ERI	
	(1-3/8		FILL AND COMPLETION						0 lbs, 3			•	FTER	DRII I	ING	(DATE		38% 3TAI	DEPT	H OF BORING	
	t ceme				READ				Not Re			,		ot Rec		(5) (1)		1.5 f		TO BOTH	
														(%)		(%		(Jst)			
£		aphic				ation	nber	oth (ft	.⊑	 (¥	Ē	5	(%	nteni	(%)	gex (	<u>.</u>	Strength (tsf)	ρο <del>ξ</del>	:	
Elevation (ft)	Œ	Material Graphics				Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Strer	Drilling Method		
Elevat	Depth (ft)	lateri	-	Nacarintian		amp	ampl	ampl	lows	-Valu	enetr	ecov	W 00	loistu	iquid	lastic	rgani	Shear (	rilling	Remarks/ Other Tests	
	40		SANDY SILTY CLAY (C	Description  CL-ML); very stiff to har	d; brown;	S	S13		12-13-24		18	16	, N	2			0	S	$\sim$	PP: 2.5 tsf	$\pm$
	45		wet; some fine SAND; t plasticity; slow dilatancy		1	X		41.5					52	16.5	22	7	2.1		000000000000	TV: 2.1 tsf	E
	$\equiv$					F	V .	71.5													E
	∃																		200		F
	=																				F
	∄																				
	Ξ																				E
245.41	45		SILT with SAND (ML); I			-	S14	45	15-22-25	47	18	17									E
	=		SAND; no plasticity; slo trace organics; frequen	t calcite seams; frequer		X		46.5					81.7	29.2/			2.4			Atterberg Limits:	
	$\equiv$		reddish brown partings.			-	V							27.9						INF	
																					Ē
	=																				F
	₫																				E
240.41	50						S15	50	19-22-17	39	18	16									
	₹		SANDY SILT (ML); hard	d; olive brown; wet; fine		- X		51.5					05.7	00.0							
	Ξ		SAND; weak cementati pockets of oxidation.										65.7	29.8							Ė
																			200		E
	=																				Ė
	_																				Ė
	$\exists$																				
235.41	55		Poorly-graded SAND (S wet; fine; trace SILT; lo			_//	S16	55	19-26-28	54	18	18							<u> </u>		F
	∃		frequent reddish brown		zi itatiUI I,	$ \rangle$		56.5													
	$\exists$					-															
	=																				F
	=																				Ė
	=																				Ė
	= =																		1000		E
230.41┕	<b>-60</b>	1	(continue	d)				-	1	1										1	
									REPORT											OLE ID	_
									BORIN DIST.	_	JNTY		RO	UTE	F	POST	MILE		E	0002R A	
<u></u>	<b>(</b>	`ΔΙ	LIFORNIA	URS HMN	1 ARUP			F	PROJECT	ORF	BRIDG	GE N	AME								
	H	iah-	Speed Rail Author	rity California	HGH-SPEED	TRAN			Califorr BRIDGE N	nia H	igh-	Spe	ed T	rain RED B	<b>V</b>			DA	TE	QUEET	_
	opoca itali Adillol	,					OKIDGE (	NOIVIB	EK .			ggi/T		ırran		2-2	1E 20-1	SHEET 3 of 5			

N. Good	nia Hig BY Ienow CONTRA	h-Speed Train Fresno to Bakersfield BEGIN DATE COMPLETION DATE Oct-12-11 Oct-13-11 CTOR/DRILLER ers	BORE	58798	3.327	TION (La 7 / E632								H		<b>7-00</b> 2R E ELE	
DRILLING N AUGER SAMPLER SPT(1-3	METHOD (0'-5.5') TYPE(S) 8/8") E BACKF	AND SIZE(S) (ID)	SPT H	II B-8 AMME matic	R TYI ;, 140	PE/HAMN O Ibs, 3 DURING Not Re	0-incl 3 DRII	h dro	•		R DRIL		•	B( ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	OREHO 3.75 in AMMER 88%	R EFFI	AMETER CIENCY, ERI OF BORING
Elevation (ft)	Material Graphics	Description		Sample Location Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	(tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
225.41 65-		SILTY SAND (SM); very dense; reddish brown; fine; some SILT; frequent interbedded layers of brown SILT; no cementation.	wet; — — ; wet; f grayish	S17	61.5	17-50	50/ 5"	11	11	49.3	12.5					000000000000000000000000000000000000000	
		66.2', olive brown; some fine SAND; trace coars SAND; weak cementation.	se	S18	66.5	21-50	50/ 5"	11	11							000000000000000000000000000000000000000	
20.41 70 <b>-</b>		SILT with SAND (ML); hard; olive brown; wet; for coarse SAND; low plasticity; weak cementation.		S19	71.5	18-43-57	100	18	18	82.4	31.7/30.5	31	7	3.3	>		
_		Poorly-graded SAND (SP); dense; grayish brow fine; trace fines; rapid dilatancy; weak cemental	vn; wet; ition.	S20	76.5	14-18-21	39	18	18							000000000000000000000000000000000000000	
210.41—80—	<u> </u>	(continued)														0	
	CAI	LIFORNIA Speed Rail Authority	1 ARUP	AN	E F (	REPORT BORIN DIST. PROJECT Californ BRIDGE N	G RE COU OR E nia H	JNTY BRIDG	GE N	AME ed 1	Train		POSTI	MILE	DATI	S( EA	LE ID 0002R

	ECT NA		h-Speed Tra	ain Fresn	o to Bakers	sfield														CT NUN		
LOGG	ED BY		BEGIN DA	ATE (	COMPLETION DOCT-13-11	DATE				TION (La 7 / E632								Н	OLE II			
DRILL	ING CC	NTR/	ACTOR/DRILLER				IN-SITU						. (			,		SI	JRFA	CE ELE	EVATION	
	gg/D. .ING ME						DRILL F	RIG										_		•	NAVD88) IAMETER	
AUC	GER(0	'-5.5'	), ROTARY(5				Mobi	B-										3	3.75	in		
	LER TY (1-3/8		) AND SIZE(S) (I	ID)		;				PE/HAMN 0 lbs, 30			ดด						AMME 38%	ER EFF	ICIENCY, ERI	
BORE	HOLE	BACKE	FILL AND COMP	PLETION			GROUN	NDW	'ATER	DURING			•	FTER	DRILI	LING (	DATE			DEPTH	OF BORING	
Nea	t cem	ent g	rout				READIN	IGS		Not Re	corde	t 		No	ot Rec	orded		<u> </u>	31.5 t	ft 		_
Elevation (ft)	S Depth (ff)	Material Graphics		Des	cription			Sample Location	Sample Number Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	-00		SANDY SILT ( SAND.	(ML); hard; g	grayish brown; w	vet; some	fine	\ S	21 80	16-23-41	64	18	17	65.4						MANNA		
	85		Borehole termi	inated at a c	depth of 81.5' on	10/13/20	)11		81.5													_
					see Appendix E		, , , ,															
	=				"wet" because \$																	
	Ξ		drilling fluid. S	Soil moisture	al through rotary indication shou	ild not be																
	=		free groundwa		potential phreat	iic surtace	e or															E
205.41	85—		See Borehole I	l og Legend	for soil classific	eation cha	rt															
	=		and key to test			ation cha																F
	∃																					
																						E
200.41	90-																					
	$\equiv$																					E
	=																					E
	∃																					E
																						Ē
195.41	95																					E
	=																					E
																						Ē
	=																					Ē
	=																					E
400.44	100																					E
<b>-</b> 190.41	100																					
										REPORT BORING			BU							HC Si	DLE ID 0002R	
										DIST.		INTY		RO	UTE	P	OSTN	ИILE		EA		
-190.41-	<b>(</b>	CA	LIFORN	Alv	URS	HMM AR	RUP			PROJECT												
			Speed Rail		CAL	FORNA HGH-	SPEED TRA	N		Californ BRIDGE N			PF	REPAF	RED B				DA	TE	SHEET	
			•											. Ma			rran		2-	20-12	5 of 5	

Calif	ECT NAM fornia		n-Speed Train Fre	sno to Bakers	field			<b>TIC</b>				_				1	3157	77-0	IMBER <b>0</b>
LOGGE A. Po			BEGIN DATE Oct-12-11	COMPLETION D Oct-13-11				ATION (La 3 / E632									OLE 10		
DRILLI	NG CON		CTOR/DRILLER		IN-SI	ITU TES	TING				`					SI	JRFAC	CE EL	EVATION
	ner/O. E	-				andpip L RIG	e Pie	zomete	r										NAVD88)
			ROTARY(5'-82')			iling 15	500									- :	1.875		
			AND SIZE(S) (ID)					PE/HAMN 0 lbs, 30			าท						AMME 88%	R EF	FICIENCY, ERI
	(1-3/8") HOLE BA		ILL AND COMPLETION		I .			DURING				FTER	DRILI	ING	(DATE			DEPT	H OF BORING
Neat	cemer	nt gr	out		REA	DINGS		Not Re	ecordeo	1		N	ot Rec	orded		<u> </u>   8	32 ft		1
Elevation (ft)	Obpth (ft)	Material Graphics		Description		Sample Location		Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method	
	5-		ASPHALT (5) (AC). SILTY SAND (SM); bro subangular; trace GRA moderate cementation	VEL; little SILT; wea	ne; ak to	\ <u>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</u>	1 0			60	60	24.1							Hand auger to 5.0'  Modified Proctor Max $\gamma_{\rm d}$ = 136.7 pcf Optimum W <sub>i</sub> =
						000	5											{	6.4%
282.98			5.0' - 6.5', grades loose	e; weak cementation	1.	S0	2 5	3-3-3	6	18	18								Set-up for rotary drilling at 5.0' using 4.875"
			6.5' - 7.2', grades to me	edium: wet		1 50	6.5	8-9-8	17	18	18								tricone bit
	-		SILTY SAND (SM); bro		ne SAND:	$ \mathbb{X}$ $\mathbb{I}$			''	10									
			weak cementation; [AL SILT (ML); very stiff; re SAND; weak cementat	LUVIUM]eddish brown; wet; fi		S0	8 4 8	34-50	50/ 6"	12	12	43.1/ 44.9/ 89.7						000000000000000000000000000000000000000	
			9.0', grades to reddish brown.	brown mottled with	grayish	1/50	9.5	22-20-22	42	18	18	09.7							
277.98	10		SANDY CLAY (CL); ha some SAND; SILT; inte medium plasticity; wea	erbedded layers of S k cementation.	SAND;		11			10	10	58.3	18.5	28	12	3			
			SANDY SILT (ML); har SAND; low plasticity.	d; grayish brown; w	et; fine; little	₩so	6 11	29-39-50	89/ 11.5"	18	18							$\triangleright$	
						S0	12.5 7 12.5		18	18	17	69.4	24.7	32	6	1.9			
	3		Poorly graded SAND w			$ \bigcirc$	14												
272.98	15		dense; brown; wet; fine 14.7' - 15.5', grades to			S0	15.5	5-8-15	23	18	14	10.2							
																		<u> </u>	
267.98┕	<b>-</b> 20 <b></b>	17.11	(continue	ed)			1		•									1_	1
								REPORT BORING DIST.	Ģ RE	CO			UTE	F	POSTN	MILE			OLE ID 80003R A
	C	A[ gh-S	IFORNIA Speed Rail Autho	rity	HMM ARUP	TRAN	L	PROJECT Californ BRIDGE N	nia Hi	gh-	Spe						DA	 TC	SHEET

	ECT NA		h-Speed Train Fres	eno to Bakerefield														3157		
LOGG	ED BY	ung	BEGIN DATE	COMPLETION DATE					TION (La								H	OLE ID	)	<u> </u>
	oling	NTRA	Oct-12-11	Oct-13-11	IN-SIT				3 / E632	3232	2.85	9 (1	ation	nai G	ria)			3000		EVATION
	her/O.								zometei	r										NAVD88)
	ING ME				DRILL															IAMETER
			ROTARY(5'-82')  AND SIZE(S) (ID)		Fail				PE/HAMN	IED ID							_	1.875		ICIENCY, ERI
	(1-3/8		AND SIZE(S) (ID)		1				0 lbs, 30			ор						-\\\\\ 88%	KEFF	ICIENCY, ERI
BORE	HOLE E	ACK	FILL AND COMPLETION					ΓER	DURING			3 A			LING	(DATE	<i>'</i>   '		DEPTI	H OF BORING
Nea	t ceme	ent g	rout		READ	JING	5		Not Re	corde	t T		N		orded		8	32 ft		
		တ္လ				_		æ						Moisture Content (%)		(%)		(tst)		
(F)		aphic				atio	mbeı	bt (	ï.	(F)	Ē	<u></u>	(%	onter	(%)	qex	(%	)gth	pod ‡	
i) uoi	Œ	E G				e Loc	N S	e De	per 6	e (bl	ation	ery (i	ash (	e Ö	Limit Limit	ity In	( <sub>6</sub> ) so	Stre	Met	
Elevation (ft)	Depth (ft)	Material Graphics				Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	oistu	Liquid Limit (%)	Plasticity Index	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/
Ш	_20	Ξ̈́		Description ayish brown; wet; few fine		Š	ഗ് S09	20	5-10-6	Ż	18	13	70	Š	Ĕ	₫	ō			Other Tests
	Ξ		SAND; low plasticity; we	eak cementation.		X			0 10 0	10										
	Ξ							21.5					91.2		24	1	1.3			=
	25																			
	Ξ																			
	$\equiv$																		)))	
	₫																		300	
	Ξ																			
262.98	25		Poorly graded SAND wi	ith SILT (SP-SM); medium		+	S10	25	9-11-12	23	18	17								
	∃		dense; brown and dark SILT; weak cementation	yellowish brown; wet; fine	; few	IX.							8.7							
			SILT, WEAK CEITIETRALIO			$\triangle$		26.5					0.7						300	
	∃																			
	3																			
	30-																			
	₫																		200	28.5', driller notes coarser sand
	∄																		) <u>)</u>	coarser sairu
257.98	30		30'-31' grades fine to co	parse: subrounded.		7	S11	30	15-15-22	37	18	11								
	Ξ.		grade into to oc	5a. 55, 5a. 75a. 75a.		X							6.5							
								31.5												
	=																		$\sim$	
,																			000	
	$\exists$																			
	<u> </u>	Ш																		
	∄			; hard; grayish brown with wet; fine; little SAND; low																34.0', driller notes silt in cuttings
252.98	35		plasticity.	, , , , , , , , , , , , , , , , , , , ,		$\Box$	S12	35	33-45-48	93	18	14								
	_=					X							00.2	22.0	20	6	2.2			
	∃							36.5					88.3	23.8	28	6	2.3			
	<u> </u>																			<u> </u>
	$\exists$																			
	∃																		)00	
2	₫																			
5	∄																			
247.98	40		(continue																	
5			Continue	<u>u,                                      </u>				F	REPORT :	TITI F									Н	DLE ID
252.98 25								E	BORING	ĢRE			T =						S	0003R
-				,				[	DIST.	COL	JNTY	•	RO	UTE	F	OSTN	ΛILE		EA	1
6	$\geqslant$ (	Ά	LIFORNIA	LIRS HMM	ARUP				PROJECT					roi-						
			Speed Rail Author	CALFORNA HO	H-SPEED T	RAN			Californ BRIDGE N			·-	ed I REPAF		Υ			DAT	E	SHEET
<u> </u>		•		•											Γ. Cu	rran		2-2	20-12	2 2 of 5

California Hig	h-Speed Train Fre	sno to Bakersfield	d	-110:	F	0					<b>-</b> ·				1	13157		IDEK
OGGED BY A. Poling	BEGIN DATE Oct-12-11	COMPLETION DATE Oct-13-11		-HOL 1572	E LO:	САТ 73	TION (Lat / E632	t/Long :3232	or N 2.859	iorth/l 9 (N	East a √atio≀	ınd Da าal G	tum) rid)			OLE ID		
ORILLING CONTRA			IN-SI	TU TE	STIN	IG									SI	JRFAC	E ELE	VATION
Pitcher/O. Esp DRILLING METHO			Sta DRILI		•	iez	ometer	ſ										IAVD88) AMETER
	ROTARY(5'-82')				1500	)										1.875		AIVIETER
	) AND SIZE(S) (ID)		I				E/HAMM								- 1		R EFFI	CIENCY, ERI
SPT(1-3/8") BOREHOLE BACK	FILL AND COMPLETION						lbs, 30			•	AFTER	RDRIL	LING	(DATE	- 1	38% STAL D	DEPTH	OF BORING
Neat cement g			READ				Not Re					ot Rec		•	1	32 ft		
ω												t (%)		(%		tsf)		
Elevation (ft)  Depth (ft)  Material Graphics		Description				Sample Deptn (π)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
40 =	SANDY SILTY CLAY ( with frequent reddish b weak to moderate cem	CL-ML); hard; grayish br rown mottling; wet; low բ	rown plasticity;	W	513 4	10	19-20-22	42	18	18								
42.98 45	Poorly graded SAND ( with layers of brown; w moderate cementation	SP); very dense; grayish et; fine; trace fine SILT;	brown weak to		S14 4	1.5	15-21-42	63	18	18							<u>. OO OO</u>	
37.98 50	Poorly graded SAND w	ith SILT (SP-SM); very	dense;	\ \ \ !	S15 5	50 :	31-26-33	59	18	10	-							
32.98 55	grayish brown to dark y	sh brown with reddish m	ottling;			11.5	35-39-50	89	18	16	11.5					1 1	<u>ODDOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO</u>	
27.98—60	wor, me, nace organic	o, ion pisouoty.		/\	56	6.5					85.7		22	3	1.9	_		
21.90-00-	(continue	ed)																
O C1	LIEODE II A	<b>D</b>				B	EPORT ORING	COL	JNTY	,	RO	UTE	F	POSTM	ИILE			LE ID 0003R
	LIFORNIA Speed Rail Autho	URS HMM	ARUP				ROJECT aliforn					roin					•	

Calif	CT NAN fornia ED BY	High	-Speed Train Fresno to E BEGIN DATE COMPL	Bakersfield ETION DATE	BORE	HOI F	100	ATION (La	at/Long	ı or N	lorth/	Fact o	nd Da	tum)			<b>13157</b> OLE ID		<u> </u>
A. Po	oling	_	Oct-12-11 Oct-1		N21	5725	0.77	3 / E632	23232	2.859	9 (N	Last a	nal G	rid)	_	5	3000	3R	
	NG CON ner/O. I		CTOR/DRILLER		IN-SIT				\r										EVATION
	NG MET	-	iusa		Star		e PIE	zomete	:1										NAVD88) IAMETER
AUG	ER(0'-	5'), F	ROTARY(5'-82')		Faili	ng 1										4	1.875	in	
	ER TYF (1-3/8"		AND SIZE(S) (ID)					PE/HAMN 0 lbs, 3			nn.						AMMER 38%	REFF	ICIENCY, ERI
			LL AND COMPLETION					DURIN			-	FTER	DRIL	LING	(DATE			EPTH	H OF BORING
Neat	ceme	nt gro	out		READI	NGS	_	Not Re	ecorde	d		N	ot Rec	orded		8	32 ft		
Elevation (ft)	Depth (ft)	Material Graphics	Description			Sample Location			N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
			SILTY CLAY (CL-ML); hard; grayi brown mottling; wet; some fine SA 60.7', grades to reddish brown.	sh brown with rea ND; low plasticit	d y.	₩S1	17 60	44-32-37	69	18	18							000	
22.98	65		65.0', SAND grades coarse.				61.5		50/	12	12	50.7	18.6	21	5	3.4		000000000000000000000000000000000000000	
	65		os.o, o, the grades coarse.				66.5		6"									<u> </u>	
17.98	70		SILTY SAND (SM); very dense; g brown mottling; wet; fine; some Si	rayish brown with	n —	S1	71.5		88/	18	18	41.7						000000000000000000000000000000000000000	
12.98	75		SILT (ML); hard; grayish brown w mottling; wet; few fine SAND; no p 76.0', grades to grayish brown.		<u> </u>	S2	76.5	29-31-50	0 81/ 11"	17	16	91.6	29.5			1.8		3	Atterberg Limits: NP
07.98	-80		(continued)					1	1	1		I	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> (</u>	<u>Z</u> L	
								REPORT BORIN DIST.	G RE				UTE	-	POSTN	∕III E			DLE ID 0003R
	\ C	ΑI	IEODNII A	URS HMM A			L						J.L		5511	****			
1		ΑL	IFORNIA 3	LIKE FIMINI A	-			PROJECT Califorr					rain						
	<b>✓</b> Hi∉	ah-S	peed Rail Authority	CALIFORNIA HIGH	- SPEED TE	MAS		BRIDGE N					RED B	.,			DAT	_	SHEET

ဖ
Ť
÷
$\overline{}$
$\alpha$
ഗ
I
Δ
Ľ,
œ
•
က
Σ
5
۵
Ī
Ш
Ω
Ω
⋖
2
Ξ
8
$\sim$
ಣ
6
ŏ
_

	ECT NA		h-Speed Train Fr	esno to Bakersfield													T NUI <b>77-00</b>		
LOGG	ED BY	ung	BEGIN DATE	COMPLETION DATE				TION (Lat							Н	OLE II	D		
	oling	NTR	Oct-12-11 ACTOR/DRILLER	Oct-13-11		15/250 TU TES		3 / E632	3232	.ช59	(N	ational	Gria)		_		03R CE ELE	EVATION	
	her/O.				1			zometer	-									NAVD88)	
	ING ME				DRILL		00											IAMETER	
			ROTARY(5'-82')  AND SIZE(S) (ID)			ing 15		PE/HAMM	IFR ID							4.875 AMME		ICIENCY, ERI	
	(1-3/8		, , i		1			0 lbs, 30			р					68%		IOILITOT, LIT	
			FILL AND COMPLETION	N	GROU		TER	DURING			Al	TER DI	RILLING	•	′		DEPTH	OF BORING	
ivea	t ceme	ent g	TOUL		I ALS ALS			Not Re	corded					ea	T - 3	32 ft			$\top$
		S				ت ا ت	Œ					9	Moisture Content (%)	(%)		Shear Strength (tsf)			
(£)		iraph				ocatic	epth	6 in.	ol/ft)	n (in	(E)	(%)	it (%	ndex	(%)	angth	thod		
ation	h (ft)	ial G				le Lo	le D	s per	ue (k	tratio	very	Vash	ure Lin	city I	) soic	Stre	g Me		
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Conter	Plasticity Index	Organics (%)	Shear	Drilling Method Casing Depth	Remarks/ Other Tests	
	-80			Весоприон		S21	_	50	50/ 6"	18	6	(1 2		1		0,		Other roote	$\pm$
	<u> </u>					П	81.5		6"										E
							01.0												
		шШ	Borehole terminated a	at a depth of 82.0' on 10/12	/2011		-	I								1			
	85		Reamed out hole with	n 5.875" tricone bit to install standpipe piezometer on															
	=		10/13/2011.	otanapipo piozomotor on															
	Ξ		For corrosion test res	ults, see Appendix E.															F
202.98	85			d as "wet" because SPT sa															
	Ξ		drilling fluid. Soil mois	sture indication should not I	be														
			free groundwater table	of a potential phreatic surfa e.	ace or														
	90-			gend for soil classification o	hart														
	Ξ		and key to test data a	and sampler type.															E
	Ξ																		F
	=																		
	Ξ																		
197.98	90-																		F
	=																		
	╡																		
20/12	=																		
.B 2/.	Ξ																		
% .GI																			
192.98	95																		
X 기	₫																		
CHSR_F-B.GPJ ARUP DOTR LIBRARY GLB 2220/12 66 86																			
ARL	=																		
.GPJ	₫																		
۳ ا																			E
CHSt	=																		F
മ ⊔_ ■187.98	100				_	_								_					
TST 107.90	100																		
0								REPORT T		CO!	חכ							DLE ID 0003R	
ELO								DIST.	COU		\U	ROUT	E	POSTI	MILE		EA		
0.3 BOREHOLE LOG - CHSTP F-B	<b>a</b> C	Λ	LIFORNIA	URS HMM	ARUP			PROJECT	OR B	RIDG	F NA	ME							
BORE			Speed Rail Autho		GH-SPEED T	PAR.		Californ	ia Hi	gh-S	Spe	ed Tra				-		1 =:	
1.0.3	n	9112	opeed Ruii Aumo	Jilly Surrentan	an alta		E	BRIDGE N	UMBE	:K		EPAREI Magg		Curran		DA 2-	TE 20-12	SHEET 5 of 5	

PROJE <b>Calif</b>	orni	a Higi	h-Speed Train Fresno to Bakersfield	1												_   1	13157	77-00	MBER )	
LOGGE A. Po			BEGIN DATE COMPLETION DATE Oct-24-11 Oct-25-11					TION (La 1 / E632									OLE 10 <b>300</b> (			
DRILLII	NG CC		CTOR/DRILLER	IN-SIT	U T	EST	ING									SI	JRFA	CE EL	EVATION	_
Pitch DRILLII				DRILL	DI	2										_		•	NAVD88) DIAMETER	
			s'), ROTARY(15.5'-81.5')	Faili			00										3.875		JIAIVIE I EK	
SAMPL	ER T	PE(S)	AND SIZE(S) (ID)					PE/HAMN								H	AMME		FICIENCY, ERI	_
SPT(			ILL AND COMPLETION					0 lbs, 30			•	FTFF	וופח פ	LING	/DATE		38%	NEDT	H OF BORING	_
Neat				READ				Not Re			, ,		ot Rec		(6) (1)	.	31.5 f		THOI BOILING	
													(%)		<u></u>		if)			
Elevation (ft)	Depth (ft)	Material Graphics	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
			CONCRETE (12") (CR).			S01	0	ш		60	60	N			ш.	0	0)	प्रि	Hand auger/garbage	-
	_	> 4 4	CUT (MI) and dish have and have an exist to de-	6	000													}}	barrel to 5.0'	
	5		SILT (ML); reddish brown and brown; moist to dry to medium SAND; weak cementation; [FILL].	y, iine	000													}		
					202													{}		
	∃				203							51.8						{{	Modified Procto Max γ <sub>d</sub> = 121 pcf	r:
					2003													{{	Optimum W <sub>i</sub> =	
	$\exists$				200		5													
278.69	5		5.0' Grades to brown.			S02	5	7-33-42	75	18	18									
	<u> </u>		SILTY SAND (SM); very dense; reddish brown wireddish layers; moist to dry; fine to medium SANI	ith	1)													}}		
	=	$\mathbb{H}$	[ALLUVIUM].		A	S03	6.5	20-41-50	91/	16	16							}}		
	=		SANDY SILT (ML); hard; reddish brown with brow layers; moist to dry; trace fine GRAVEL; fine to m SAND; low plasticity.	wn nedium	M	000	8	20-41-30	10"	10	10	59.9	25.2	27	1	3.1				
			SILTY SAND (SM); hard; brown; moist to dry; little SILT.	e	M	S04	8	13-16-14	30	18	16	24								
273.69	10		9.1', grades to grayish brown.  SANDY CLAY (CL); hard; grayish brown; dry; sor fine SAND; trace medium to coarse SAND; low	 me	$\frac{1}{M}$	S05	9.5	11-23-40	63	18	18									
			plasticity; weak cementation.  Poorly graded SAND with SILT (SP-SM); very der		$\mathbb{A}$	000	11	05.07.00	200	10	40	55.8	18.4	25	8	2.6				
		$\prod$	brown; moist to dry; few SILT; fine to medium SA trace coarse SAND; weak cementation.  11.0', grades to grayish brown with reddish brown		M	506	12.5	25-27-39	66	18	18									
	∄		mottling SANDY SILT (ML); hard; reddish brown with redo		M	S07		11-12-10	22	18	13	52.1	10.3	17	2	1.7	-	$ \{\} $		
	$\equiv$		mottling; moist to dry; some SAND; low plasticity; cementation.	weak	$'$ $\triangle$		14					65.4	12.8	19	4	2		}		
	=	$\mathbb{H}$	SANDY SILTY CLAY (CL-ML); very stiff; grayish brown; moist to dry; some fine SAND; trace medi	/	H	S08		8-8-10	18	18	18							}}		
268.69	15	$\  \  \ $	coarse SAND; low plasticity; weak cementation.  13.1', grades to brown with occasional dark brown		/XI		15 -					65.5	16.1	19	2	1.4	-	{}		
.00.08			mottling; fine to medium SAND.		$\square$		15.5					00.0	10.1	19	•	1.4				
			SANDY SILT (ML); very stiff; grayish brown; mois some fine SAND; weak cementation.	st;																
	$\exists$																			
	$\exists$																			
	$\exists$																			
	∄																			
	=																			
63.69	20		(continued)					<u> </u>			<u> </u>				I				l	-
			,					REPORT T											OLE ID	-
								BORINO DIST.		JNTY		RO	UTE	F	POSTN	/ILE		S E/	60004R A	_
	<b>(</b>	CAI	IFORNIA QUESTHAMA	ARUP				PROJECT					·							-
	H	igh-9	Speed Rail Authority	SH- SPEED TO	RAN			Californ BRIDGE N					rain RED B	Y			DA	TF	SHEET	_
			<u> </u>												ırran			20-1		í

.OGGF	<b>fornia</b> ED BY	Hig	h-Speed Tra BEGIN D	ain Fre ATE	esno to	Dakers PLETION	sfield DATE	BORE	НО	LE L	OCA <sup>-</sup>	TION (La	at/Lond	or N	North/	East a	nd Da	tum)			315 DLE II	<b>77-00</b>		_
A. Po	oling		Oct-24	l-11		1-25-11	_2 <b>L</b>	N21	56	592	.751	/ E632								S	000	04R		
	NG CO ner/W		CTOR/DRILLER wart	₹				IN-SIT	U T	EST	ING												EVATION NAVD88)	
RILLII	NG ME	THOE	)					DRILL												ВС	REH	OLE D	NAMETER	-
			5'), ROTARY		81.5')			Faili				PE/HAMN	/IED II	<u> </u>						_	.875		FICIENCY, ERI	_
	_ER 14 (1-3/8		AND SIZE(S) (	<i>(</i> טו								) lbs, 3			ор						NIVIIVIE 88%	.r. Ett	ICIENUT, EKI	
BOREF	HOLE E	BACKE	FILL AND COMF	PLETION	1			GROU READ			ΓER	DURIN			G A				(DATE				H OF BORING	-
neat	ceme	ent gr	rout					NLAD	IIVC			Not Re	ecorde	d		N	ot Rec	orded		8	1.5 f	t 		_
Elevation (ft)	Oepth (ft)	Material Graphics			Descript				Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	3
			SILT (ML); ha brown mottling	rd; grayi; g; moist f	sh browr to wet; fe	n with frequ	uent reddi	sh		S09	21.5	9-13-12	25	18	18	89.8						<u> </u>	21.5', mud tub s 3.875 drag bit	se <sup>·</sup>
58.69	25		SILTY SAND SILT; fine to n SILT (ML); ha mottling; wet;	nedium S rd; grayis	SAND; w sh browr	eak cemer with redd	ntation.			S10	25 26.5	9-16-26	42	18	10	79	19.2					<u>0000000000000000000000000000000000000</u>		
	30		SILTY SAND weak cementa 30.9', SILT ler fine to mediun	ition. ns; brown						S11	30 31.5	18-20-16	36	18	17	28.4/ 82.8								
	35		35.0', grades t	to very d	ense; re	ddish brow	vn.			S12	35 36.5	11-23-41	64	18	16	32.1						1000000000000000000000000000000000000		
43.69┷	4U		(0	ontinue	ed)				-															
											E	EPORT BORIN	Ģ RI	ECC			UTC	1.5	)OOT*	411 F		S	OLE ID 0004R	_
		- A I		11 A		D	ILB # CLC					IST.		JNTY			UTE		POSTN	/IILE		EA	۸	
9		A	LIFORN Speed Rail	NΙΑ		URS	HMM A	KUP				ROJECT Californ					rain							
	Н	iah-	Speed Rail	Autho	ribe	1						RIDGE				REPAF						TE	SHEET	

	JECT NA		h-Sneed Train F	resno to Bakersfield													- 1		T NUN		
LOG	GED BY Poling	<u>9</u>	BEGIN DATE Oct-24-11	COMPLETION DATE Oct-25-11	BORE	HC	LE L	OCA	ATION (La 1 / E632	it/Long	or N	lorth/	East a	nd Da	tum)		Н	OLE IE	)		
		NTRA	ACTOR/DRILLER	OG-20-11	IN-SIT					-+200	.21	, (1)	valiUl	iai G	iiu)			3000 JRFAC		VATION	
	cher/W																_			IAVD88)	
	LING ME GER(0		) 5'), ROTARY(15.5	'-81.5')	DRILL Fail			00										OREH 3.875		AMETER	
SAM	PLER TY	PE(S)	AND SIZE(S) (ID)	,	SPT F	ΗΑN	ИМЕГ	R TYI	PE/HAMN								H	AMME		CIENCY, ERI	
	T(1-3/8		FILL AND COMPLETIC	NA .	l .				0 lbs, 30			•	\	DDII	LINO	/D A T F		58% 57.41.1	DEDTI	OF BORING	
	at ceme			N	READ			IER	Not Re			o F	AFTER N		corded	•	<i>'</i>	31.5 f		OF BURING	
														(%)		<u></u>		£			$\prod$
		Material Graphics				tion	ber	Sample Depth (ft)	<u> </u>		Ē.		<u>.</u>	Moisture Content (%)	(%	(%) xa		Shear Strength (tsf)	ا ۾		
on (ft)	E	Gra				Loca	Nun	Dept	er 6 i	f/lq)	tion (	y (in	%) ys	Sol	imit (	y Ind	s (%)	treng	Meth		
Elevation (ft)	Depth (ft)	terial				Sample Location	Sample Number	mple	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	isture	Liquid Limit (%)	Plasticity Index	Organics (%)	ear S	Drilling Method Casing Depth	Remarks/	
ä	40 <u>40</u>	∑ ≅	OANDY OUT (MIL)	Description		Sai					_		700	§ ¥	Ρij	Pla	ő	S.		Other Tests	Щ
			SANDY SILT (ML); It some SAND.	nard; grayish brown; wet; fine;	,	X	S13	40	9-17-19	36	18	12	63.4								Ħ
								41.5	i												Ħ
	=																				B
	=																				H
																					Ħ
	=																				H
	] _ =																				Ħ
238.6	45		SANDY SILTY CLAY	(CL-ML); hard; grayish brownottling; wet; trace medium to	 /n	X	S14	45	24-50	50/ 5.5"	12	10									Ħ
	=		coarse SAND; low pl	asticity; weak cementation.	,		7	46.5	;				60.5	20.2	22	5	2.3				
	=																				E
																					Ħ
	=																				
	45																		<u>0000000000000000000000000000000000000</u>		
																					E
233.6	50-		50.0', grades to gray	rish brown.		X	S15	50	50	50/	5	4	-								Ħ
			, g g,							5"											
	$  \exists$		54 51 and do to ano	ink kan a dalink and dink and dink			016	51.5	17-23-27	50	10	12	-								E
	=		51.5', grades to gray	rish brown with reddish mottlir	ng.	X	310	51.5	17-23-27	50	18	13									Ħ
1						Ľ	<b>Y</b>	53													
	=					$\setminus$	S17	53	18-29-40	69	18	16									Ħ
	=		SILT (ML); hard; gra wet; trace fine SAND	yish brown with reddish brown	 n;	7		54.5	i				06.0	30.1							Ħ
228.6	55	$\parallel \parallel \parallel$	SILT with SAND (ML	.); hard; grayish brown with re	eddish		S18	54.5	31-45-50	95/ 9"	15	15	96.9	30.1							
1			brown mottling; wet; medium plasticity; w	little fine to medium SAND; eak cementation.		V		56					82.9	35.7	39	10					E
																					Ħ
	=																				Ħ
5																					Ħ
2																					Н
228.6																					Ħ
-223.6	9-60-	шШ	(contin	ued)					<u> </u>	1				I	I	I	I				-
			100	,					REPORT											LE ID	$\dashv$
									BORINO DIST.		CO JNTY			UTE	1 -	POSTN	∕III F		S(	0004R	_
		· A		URS HMM A	מו ום									01E		JUIN	vIIILE				
		A	LIFORNIA	LIKE HIMIN A					PROJECT Californ					rain							
	Н	igh-	Speed Rail Auth	ority California Ho	H-SPEED T	RAN			BRIDGE N			PF	REPAR ). Ma	RED B		ırran		DA <sup>-</sup>	TE 20-12	SHEET 3 of 5	
													. ivia	99"	. 00	mall		12-4	_U- IZ		

Cali LOGG A. P	ED BY oling	a Higl	h-Speed Tr BEGIN I Oct-2 CTOR/DRILLE	DATE 4-11	COMPL	Bakersf ETION DA 25-11	ATE I		565	92.	751	TION (La / E632								1 H	1315 OLE II 800	04R		
Pitch DRILL AUG SAMPI SPT	ner/W ING ME BER(0 LER TY	. Stev ETHOD '-15.5 'PE(S) B")	vart s'), ROTAR AND SIZE(S)	/(15.5'-8 (ID)	31.5')		1	DRILL <b>Faili</b> SPT H	RIG ng 1	1500 VER	0 TYF	PE/HAMM ) lbs, 30			op					2 B(	283.6 OREH 3.875	9 ft ( OLE D in	NAVD88) DIAMETER SICIENCY, ERI	
	HOLE I		ILL AND COM out	PLETION				GROU READI			ER	DURING Not Re			) A		R DRIL lot Red		(DATE	′ I	OTAL 31.5 1		H OF BORING	
Elevation (ft)	Depth (ft)	Material Graphics			Description						Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
218.69	65		Poorly graded grayish brown SILT; mediur cementation.	n with redon SAND; ti	dish brown	n mottling; ngular GR	wet; few AVEL; w	veak		6	60 61.5	32-50	50/6"	12	8							aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa		
			Poorly graded trace SILT; fi SANDY SILT wet; little fine plasticity; wea	ne to medi Y CLAY (0 SAND; tra	ium SANE CL-ML); hace mediu	); weak ce	mentatio	on. j			65 66.5	33-30-26	56	18	16	67.3	24.6	26	7	2.1		<u> </u>		
213.69	70		SANDY SILT SAND.	(ML); hard	d; grayish	brown; we	et; some	fine	S		70 71.5	32-50	50/ 5"	11	11	55.5	\31.5/ 30.5	33	8	2.3	_	$\triangleright$		
208.69	75		Poorly graded SILT; mediur	d SAND (S n SAND; v	SP); dense veak ceme	e; brown; wentation.	vet; trace		S		75 76.5	29-22-16	38	18	13							1000000000000000000000000000000000000		
203.69 <del>-</del>	<b>-</b> 80	, 1	(	continue	d)						-													
	<u>)</u> (	CAI	_IFORI	NIA		URS I	HMM   AR	UP			D	REPORT BORING DIST. PROJECT Californ	COL	INTY	SE N	RC AME	UTE rain	F	POSTN	MILE			OLE ID 0004R	
	Н	igh-9	peed Rail	Author	rity	CALFT	ORNA HIGH-	SPEED TH	IAN			RIDGE N			PF	REPA	RED B	Υ Γ. <b>C</b> u	ırran		DA 2-	TE 20-1:	SHEET 2 4 of 5	

7
$\overline{}$
`_
<u> </u>
2
I
<u>.</u>
~
-
n
_
2
$\supseteq$
불
Ĺ
<u> </u>
₹
Ñ
_
20
$\geq$
R
<u>``</u>
ŏ

DOCEDED Y  BESINDATE OCH 25-11 OCH 25-11 OCH 25-17 OCH 25-17 No.1165982 751 F6524256 277 (National Grid) SUDPLET STRING SUPPLET STRING SUPPLET STRING SUPPLET STRING SUPPLET STRING SUPPLET SUPPLET STRING SUPPLET SUP	PROJEC			h-Spee	d Trai	n Fres	sno to	Bake	ersfield														13157		JMBER 10	
RILLING CONTRACTORDRILLER RICHAM SERVENT RILLING METHOD  AUDICENCY -15-59, ROTARRY (15.5'-81.5') Failing 1500  BANULER TYPE-SA MO SIZE-SI (IID) SPI HAMMER TYPE-HAMMER IID AUTOMATICA TYPE-SA MO SIZE-SI (IID) SPI HAMMER TYPE-HAMMER IID AUTOMATICA TYPE-HAMMER IID AUTOMATICA TYPE-HAMMER IID AUTOMATICA TYPE-HAMMER IID READINGS MARK Records READINGS MARK RECORD MARK RECORD MARK RECORDS READINGS MARK RECORD MARK RECORDS READINGS MARK RECORDS READINGS MARK RECORDS MARK RECORDS READINGS MARK RECORDS MARK RECORDS MARK RECORDS READINGS MARK RECORDS MARK RECORDS MARK RECORDS MARK RECORDS READINGS MARK RECORDS MARK R	OGGE	D BY	····•	BE	GIN DAT	ΤE	COM	PLETIO	N DATE	BORE												Н	OLE IE	)		
RELING METHOD  AUDICER(PI-15-9). ROTARY(15.5-81.5)  Falling 1500  SPI HAMMER TYPE/MAMBER TO  AUDICER(PI-15-9). ROTARY(15.5-81.5)  Falling 1500  SPI HAMMER TYPE/MAMBER TO  AUDICER(PI-15-9). ROTARY(15.5-81.5)  SPI HAMMER TYPE/MAMBER TO  AUDICER(PI-15-9). ROTARY(15.5-81.5)  SPI HAMMER TYPE/MAMBER TO  AUDICER(PI-15-9). ROTARY(15.5-81.5)  AUDICER(PI-15-9). ROTARY(15.5-81.5)  AUDICER(PI-15-9). ROTARY(15.5-81.5)  SPI HAMMER TYPE/MAMBER TO  AUDICER(PI-15-9). ROTARY(15.5-81.5)  AUDICER(PI-15-9). ROT	ORILLIN	ig co		CTOR/D				. 20-11	•					. , _002	. +200		' (1\	iatiUl	iui G	. iu)		SU	JRFA	CE E	LEVATI	
AUGER(P(1-5,S), ROTARY(15,S-61,S)  Falling 1500  SPT HAMMER TYPE HAMMER ID Automatic, 140 lbs, 30 inch drop  GROUNDWARE TYPES, 30 inch drop  GROUNDWARE ROUND AND SE(S) (ID)  READINGS  RE										DDILL	DIC														•	-
Automatic, 140 lbs, 30-inch drop Reconstruction Rec					TARY(1	15.5'-8	1.5')			1			00												DIAIVIE	IER
OREHOLE BACKFILL AND COMPLETION Real terminal grout Real Comment grout				AND SIZ	ZE(S) (ID	)											n.							REF	FICIEN	ICY, ERi
Borehole terminated at a depth of 81.5 on 10/24/2011.  Borehole terminated at a depth of 81.5 on 10/24/2011.  For corrosion test results, see Appendix E.  Soil mostates indicated as "yet" because SPT samples by the first plut of the standard of the used as an indication of a potential phreatic surface or free groundwater facilities had and sampler type.  CALIFORNIA  High-Speed Rail Authority  CALIFORNIA  High-Speed Rail Authority  Table 1900 See Borehole Log Legend for soil desaffication chart and key to test dista and sampler type.				ILL AND	COMPLI	ETION											-	FTER	RDRIL	LING	(DATE			DEP	TH OF E	BORING
88.0 g grades to grayish brown, fine to medium SAND. 80.6; grades to fine S	Neat	ceme	ent gr	rout						READ	ING	S		Not Re	corde	t		N	ot Rec	orded		8	1.5 f	t	_	
88.0 g grades to grayish brown, fine to medium SAND. 80.6; grades to fine S	Elevation (ft)	Jepth (ft)	laterial Graphics			D	orinti	ion			ample Location	ample Number	ample Depth (ft)	lows per 6 in.	-Value (bl/ft)	enetration (in)	ecovery (in)	00 Wash (%)	loisture Content (%)	iquid Limit (%)	lasticity Index (%)	rganics (%)	hear Strength (tsf)	rilling Method	asing Deptin	
Borehole terminated at a depth of 81.5 on 10/24/2011. For corrosion test results, see Appendix E.  Soil moleture indicated as "wet" because SPT samples became wet during retrieval through rotaty method used as an indication of a potential phreatic surface or free groundwater table.  See Borehole Log Logend for soil classification chart and key to test data and sampler type.  See Borehole Log Logend for soil classification chart and key to test data and sampler type.  REPORT TITLE BORNING RECORD DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR PRIDGE NAME Califfornia High-Speed Train BRIDGE ON WIBER I PREPARED BY DATE SHEET	<del></del>	30	2	80.0', g	rades to				medium S	AND.								2	2		п.	0	<u> </u>		011	ici i csis
REPORT TITLE BORING RECORD SO004R  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NAME CALIFORNIA High-Speed Rail Authority  DATE SHEET				80.6', g	rades to	fine SAI	ND.				Å		81.5													
REPORT TITLE BORING RECORD SO004R  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NAME CALIFORNIA High-Speed Rail Authority  DATE SHEET		=		Borehol	le termina	ated at a	a depth	of 81.5	on 10/24	/2011.																
REPORT TITLE BORING RECORD SO004R  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NAME CALIFORNIA High-Speed Rail Authority  DATE SHEET		∃		For corr	rosion tes	st result	s, see A	Appendi	x E.																	
REPORT TITLE BORING RECORD SO004R  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NAME CALIFORNIA High-Speed Rail Authority  DATE SHEET		Ξ		became	wet duri	ina retri	eval thr	ouah ro	tary meth	od <sup>'</sup>																
REPORT TITLE BORING RECORD SO004R  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NAME CALIFORNIA High-Speed Rail Authority  DATE SHEET				used as	an indic	cation of	ure indic f a pote	cation sh ntial phr	hould not leatic surfa	be ace or																
REPORT TITLE BORING RECORD SO004R  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NAME CALIFORNIA High-Speed Rail Authority  DATE SHEET	98.69	35								h d																
REPORT TITLE BORING RECORD SO004R  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NAME CALIFORNIA High-Speed Rail Authority  DATE SHEET		$\exists$							sification o	hart																
REPORT TITLE BORING RECORD SO004R  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NAME CALIFORNIA High-Speed Rail Authority  DATE SHEET		$\exists$																								
REPORT TITLE BORING RECORD SO004R  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NAME CALIFORNIA High-Speed Rail Authority  DATE SHEET		$\exists$																								
REPORT TITLE BORING RECORD SO004R  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NAME CALIFORNIA High-Speed Rail Authority  DATE SHEET		=																								
REPORT TITLE BORING RECORD SO004R  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NAME CALIFORNIA High-Speed Rail Authority  DATE SHEET		Ξ																								
REPORT TITLE BORING RECORD SO004R  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NAME CALIFORNIA High-Speed Rail Authority  DATE SHEET																										
REPORT TITLE BORING RECORD SO004R  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NAME CALIFORNIA High-Speed Rail Authority  DATE SHEET	93.69	90-																								
REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Rail Authority  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET		$\equiv$																								
REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Rail Authority  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET		=																								
REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET		∄																								
REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET		∃																								
REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET		$\exists$																								
REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET	88.69	95																								
REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET		∄																								
REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET		$\equiv$																								
REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET		∃																								
REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET		₫																								
REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET		₫																								
REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET		∃																								
BORING RECORD S0004R  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET	83.69 <b>-</b> 10	00																					—			
BORING RECORD S0004R  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET																							—	F	HOLE ID	)
CALIFORNIA High-Speed Rail Authority  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET													E	BORING	Ģ RE			R∩	UTF	[	POSTA	/II F		;	S0004	
High-Speed Rail Authority  High-Speed Rail Authority  California High-Speed Train  BRIDGE NUMBER PREPARED BY DATE SHEET			۱۸:	LIEC	)DNI	IIΛ		LIE	RS   HMM	ARLIP									J1E		JJ11	mLE.			-^	
BRIDGE NUMBER   PREPARED BY DATE   SHEET							ibe	7						Californ	ia Hi	igh-	Spe	ed T					T-			
D. Maggi/T. Curran 2-20-12   5 of 5		П	ign-	peed	Kall A	UIIIOF	пу		LALF CRINA H	OT DESCRIPTION	KAN		E	BRIDGE N	IUMBE	R					ırran		DA 2-:	TE <b>20-</b> 1	12   S	HEET 5 of 5

	CT N forni	a Hig	h-Speed Train Fre	esno to Bakersf	field	=HO	IFI	OCA	TION (La	t/Long	or N	lorth/	Fact a	nd Da	tum)		_ 1	ROJEC <b>1315</b> OLE IE	77-00	MBER )
A. Po	oling		Oct-13-11	Oct-14-11	N2°	155	457	.493	3 / E632								5	3000	)5R	
DRILLII Pitch			ACTOR/DRILLER		IN-SI <sup>-</sup>				zometei	r; PS	Log	ging	g				- 1			EVATION NAVD88)
DRILLI					DRILI	L RI	G.										В	OREH	OLE [	DIAMETER
			ROTARY(5'-82')  AND SIZE(S) (ID)		Fail SPT I				PE/HAMIV	1ER ID	)							1.875 AMME		FICIENCY, ERI
SPT	(1-3/	8")							0 lbs, 30			•					(	38%		
N/A	HOLE	BACK	FILL AND COMPLETION	l .	READ			IER	DURING Not Re			j A		ot Rec		(DATE	<i>'</i>	31 AL 32 ft	DEPT	H OF BORING
														(%)		(9)		sf)		
Elevation (ft)	Depth (ft)	Material Graphics	,	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
		2	ASPHALT (7") (AC).	Description			S01		ш		60	60	-2	2		<u> </u>	0	o o	7	Hand auger to 5.0'
			Poorly graded SAND w fine; subangular; trace cementation; [FILL].	vith SILT (SP-SM); bi SILT; trace coarse \$	rown; dry; SAND; weak	000000000000000														Modified Proctor Max γ <sub>a</sub> = 133.9 pcf Optimum W <sub>i</sub> = 6%
280.26	5-						S02	5	5-5-49	54	18	18							KI.	Set up mud rotar
	Ξ					_\X	002			"	.0		13.8							at 5.0' using 4.875" tricone bit
	Ξ		Poorly graded SAND wareddish brown; dry; fine	e; few SILT; trace co	arse SAND;	$\mathbb{R}$	S03	6.5	50	50/	4	4	13.6							casing at 5.0'
			weak to moderate cem	nentation; [ALLUVIUN	M].		004	8	50	3.5"										7.0', driller notes hard material
			8' grades to brown.			X	S04	9.5	50	50/ 6"	6	6							00000	
275.26	10		SANDY SILT (ML); har brown mottling; moist; SAND; low plasticity.			X	S05	9.5	17-34-37	71	18	14	59.7	21.1	26	4	1.9	_		
			SANDY SILT (ML); rec moist; fine; trace organ plasticity.			$\bigvee$	S06	11	9-23-22	45	18	14	57.6	21.8	23	3	1.5	_	10 = 1	
	=		SANDY SILTY CLAY (	(CL-ML); brown with	reddish		S07	12.5 12.5	21-42-50	92/	17	13	07.0	21.0	20		1.0			
	Ξ		mottling; wet.			V		14		10.5"			67.7	18.4	23	5	2.1	-		
	Ξ		SANDY SILT (ML); bro	- — — — — — — — — — — — — — — — — — — —			S08	14	28-50	50/	18	10	54.7							
270.26	15	1						15.5					0						000000000000000000000000000000000000000	15.0', ends continuous sampling
265 26	=																		DIDDIDIDI	
265.26┕	-20		(continue	ed)																
								E	REPORT BORING DIST.	G RE	CO			UTE	F	POSTI	MILE			OLE ID 60005R 4
	(	CA	LIFORNIA Speed Rail Autho	URSIL	HMM ARUP				PROJECT Californ			Spe	ed T							
		iigh-	Speed Rail Autho	ority	ORNIA HIGH-SPEED T	TRAIN		E	BRIDGE N	IUMBE	R			RED B		ırran		DA	TE 20-1:	SHEET 2 1 of 5

Calif	ECT NA		h-Speed Train I	Fresno to Bakersfield	d	-1101	F100	ATION "	n#/l = :		autt /*	Fa-1 ·	nd C:	4		1	13157	77-00	/IBER
OGGI A. P	ED BY oling		BEGIN DATE Oct-13-11	COMPLETION DATE Oct-14-11				ATION (La 3 / E632									OLE 10		
DRILLI	NG CO		CTOR/DRILLER		IN-SI	TU TE	STING							-		SI	URFAC	CE ELE	VATION
	ner/Os		)		Sta		oe Pie	zomete	er; PS	Log	gınç	)				_			AMETER
			, ROTARY(5'-82')		Fail	ling 1											4.875		, avic I CIX
	LER TY (1-3/8		AND SIZE(S) (ID)					PE/HAMN 0 lbs, 3			n					- 1	AMME 68%	R EFFI	ICIENCY, ERI
			ILL AND COMPLETI	ION	GRO	UNDW	VATER	DURIN				FTER	DRIL	LING	(DATE			DEPTH	OF BORING
N/A					READ	DINGS	· ·	Not Re	ecorde	d 		N	ot Rec	orded		8	32 ft		
Elevation (ft)	Oepth (ft)	Material Graphics		Description			Sample Number Sample Depth (ft)		N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
			SILTY SAND (SM); with grayish brown; cementation.	dense; mottled dark reddis wet; fine; little SILT; weak	h brown	S	21.5		9 32	18	10	17.5						000000000000000000000000000000000000000	
60.26	25		SILT (ML); very stif reddish brown; wet;	ff; mottled dark grayish brow ; few SAND.	n with	s	25.5		3 24	18	10	91.9						<u> </u>	
55.26	30 =					s	11 30	12-17-22	39	18	18								
				SAND (CL-ML); hard; grayisl mottling; wet; fine; trace org lasticity.			31.5	5				74.4	17	25	7	2.7			
50.26	35		grayish brown with	D with SILT (SP-SM); very of dark yellowish brown mottling SILT; weak cementation.		s	36.5		92/11.5"	18	14	7.3						000000000000000000000000000000000000000	
45.26	40	TH	(conti	nued)				1	1	1				I		<u> </u>		للكا	
<u></u>	<b>\</b>	١٨:	I IE ODNII	↑ URS HMM	1 ARID			REPORT BORIN DIST.	COL	JNTY			UTE	F	POSTM	ИILE			DLE ID 0005R
		A	LIFORNIA	LIKES HIMIN	ARUP			PROJECT Califorr	r or b nia H	RIDG igh-S	E N/ Spe	AME ed T	rain						
	H	gh-	Speed Rail Aut	hority	HGH-SPEED T	TRAN		BRIDGE N			PF	REPAF . Ma	RED B				DA	TE 20-12	SHEET 2 of 5

Calif	CT NA	a Hig	h-Speed Train Fresno to Bakersfield														1315 <sup>-</sup>	T NUN <b>77-00</b>		_
OGGI A. Po	ED BY		BEGIN DATE COMPLETION DATE Oct-13-11 Oct-14-11					TION (La 5 / E632									OLE 10 <b>300</b> (	) 0 <b>5R</b>		
DRILLI	_		ACTOR/DRILLER	IN-SIT	U TE	ESTI	NG									SI	URFA	CE ELE	EVATION	_
	NG ME		)	Star		•	lez	zomete	r; PS	LOG	ggin	g						•	NAVD88) IAMETER	
AUG	ER(0	'-5'),	ROTARY(5'-82')	Faili	ng 1	1500											4.875	in		
			AND SIZE(S) (ID)	1				E/HAMN blbs, 30			nn -					- 1	AMME 68%	REFF	ICIENCY, ERI	
	(1-3/8 HOLE I	,	FILL AND COMPLETION	GROU	JNDV	NATE		DURING			•	AFTER	R DRIL	LING	(DATE	- 1		DEPTH	H OF BORING	_
N/A				READ	INGS	S		Not Re	corde	t		N	lot Red	orded		.   8	32 ft			_
Elevation (ft)	Depth (ft)	Material Graphics	Description				Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	3
	=		SANDY SILT (ML); hard; brown with reddish brow mottling with seams of grayish brown; wet; little		M	S13	40	30-36-50	86/ 11"	17	17									
40.26	15		organics; some coarse SAND; low plasticity; wea cementation.	k			41.5					59.5	24.3	33	6	5.1		000000000000000000000000000000000000000		
40.26	45		SILT with SAND (ML); hard; grayish brown with re brown mottling; wet; trace organics; low plasticity.		Ms	S14	45	21-50	50/ 4.5"	11	11									
	=		s.c.m.metamig, net, adde organises, ieu piacuony		Н	4	46.5					79.7	33.1	36	9	3.5				
	_		SANDY SILT (ML); hard; grayish brown with redo	dish	Ms	S15 4	46.5	30-50	50/ 5.5"	12	12	50.0						1000		
	$\exists$		Signature of the signat		Н		48					56.6 62.3				0				
					Vs	S16	48	18-26-25	51	18	16									
	=				$\mathbb{N}$	4	19.5													
35.26	50		SANDY SILTY CLAY (CL-ML); hard; brown with		Ms	S17 4	19.5	27-37-37	74	18	15									
			reddish bronw mottling; wet; some SAND; low pla	asticity.			51					64.5	19.8	24	4	1.8		<u> </u>		
30.26	55		Poorly graded SAND with SILT (SP-SM); very de brown; wet; fine; few SILT; weak cementation.	nse;	Ms	S18	55	20-27-31	58	18	16									
	$\exists$		J. J. J. Hot, and, low OILT, weak contentation.		$\mathbb{N}$	5	56.5					9								
	$\exists$																			
	=																			
	∃																			
	₫																	1000		
.05.5																				
25.26┕	-60	1 FII	(continued)																	•
								EPORT		-00									DLE ID	•
								BORING IST.	G RE				UTE	F	POST	MILE		S(	0005R	
<u></u>	<b>A</b> (	^ ^	LIFORNIA JURS HAMMA	ARUP				ROJECT												
			Speed Rail Authority	-			C	Californ	ia H	igh-	Spe	ed 1								
	Н	ıgn-	Speed Kall Authority	SH-SPEED T	KAN		В	RIDGE N	IUMBE	ER			RED E I <b>ggi</b> /		ırran		DA 2-	TE 20-12	SHEET 3 of 5	

Calif	forni	AME <mark>a Hig</mark>	h-Speed	d Train F	resno to	Bakersfield													1	3157	77-00	
OGGI A. Po	ED BY		BEC	GIN DATE ct-13-11	COMPL Oct-1	ETION DATE					TION (La 3 / E632									OLE ID		
DRILLI	NG CC		CTOR/DR	RILLER			IN-SI7	Тυт	ESTI	ING							-,		SL	JRFAC	CE ELE	EVATION
	ner/O								•	Piez	zomete	r; PS	Log	gging	9							NAVD88)
	NG ME SER(0			Y(5'-82')			DRILL Fail			0										JREH 1.875		IAMETER
SAMPL	LER TY	PE(S)	AND SIZE				SPT H	IAM	MER	TYF	PE/HAMN								H/	AMME		ICIENCY, ERI
	(1-3/8		-11 1 AND (	COMPLETIC	NA I						DURING			•	CTCD	DDII	LINO	(DATE		58% 57.41.1	DEDTI	H OF BORING
N/A	HOLE I	BACKI	-ILL AND (	JOINIPLETIC	N		READ			EK	Not Re			o P		ot Rec		DATE	1	31 AL 1	JEPIN	1 OF BORING
							•									(%)		(9		sf)		
Elevation (ft)	Depth (ft)	Material Graphics			Description	1			Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
	65		65.0', gra	ades to redd	ish brown; fi	ne to medium S	AND.	X	S20	60 61.5 65 66.5	50	50/ 5.5"	6	6							000000000000000000000000000000000000000	
210.26	70		yellowish cementa	i brown; wet;	fine; some	eddish brown w SILT; weak		X	S22	70 71.5 75 76.5		58	18	15	16/ 38.2						000000000000000000000000000000000000000	
205.26	-80			(continu	ued)					E	REPORT BORIN	G RE									HO S(	DLE ID 0005R
		~ A		DK II A		I I I I I I I I I I I I I I I I I I I	ADI ID				IST.		JNTY			UTE	F	POSTM	/IILE		EA	
		_A	LIFO	RNIA	1	URS HMM	ARUP				ROJECT Californ					rain						
					-																	

	ECT NA		h-Speed Train Fre	esno to Bakersfie	ld														T NUI		
LOGG	ED BY	ıııg	BEGIN DATE	COMPLETION DAT	E BOF				TION (La								Н	OLE II	)		
	oling	NTRA	Oct-13-11 ACTOR/DRILLER	Oct-14-11			1457 TEST		3 / E632	5236	.569	) (IN	lation	ai Gi	iiu)		_		DSR DE ELE	EVATION	
	her/Os				Sta	and	oipe		zometer	r; PS	Log	ging	3				_			NAVD88)	
	ING ME SER(0		) ROTARY(5'-82')			L RI	G j 15(	00										DREH 1.875		IAMETER	
SAMP	LER TY	PE(S)	AND SIZE(S) (ID)		SPT	HAN	ИМЕГ	R TYI	PE/HAMM								H	AMME		ICIENCY, ERI	
	(1-3/8		FILL AND COMPLETION	ı					0 lbs, 30				FTER	DDILI	INC /	DATE		88%	DEDTL	OF BORING	
N/A	I IOLL I	ACRI	TEL AND COMPLETION	<b>V</b>		DINC		ILK	Not Re			-		t Rec		DATE	′ I	32 ft	DLFII	TOT BOKING	
					·									(%)		(%)		sf)			
		phics				ation	per	th (ft)	.⊑	æ	(ii)	_	(%)	ntent	(%)	ex (%	_	gth (t	ا م		
on (ft	(#)	II Gra				00	Nun	Dep	oer 6	e (bl/	ation	ery (ir	3) yse	e Co	imit	ty Inc	%) so	Stren	Meth		
Elevation (ft)	Depth (ft)	Material Graphics				Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/	
Ш	80	≥	SILT with SAND (ML):	Description hard; brown with reddis	sh brown	X	_	_	<u>5</u> 0	50/	5	5		Σ		₫	0	क	<del>/ -    </del>	Other Tests	+
	-		mottling; wet; some fin	ne SAND; weak cementa	ation.		3	04.5		5"			74.9						0000000		
	Ξ							81.5													
	$\equiv$	ШШ	Borehole terminated a	t a depth of 82.0' on 10	/14/2011																
	85		Overdrilled hole to 95.0																		
	Ξ		For corrosion test resu	ılts, see Appendix E.																	
	Ξ		became wet during ret	d as "wet" because SPT rieval through rotary me	ethod <sup>.</sup>																
200.26	85		used as an indication of	ture indication should n of a potential phreatic s																	E
	=		free groundwater table																		
	Ξ		and key to test data ar	end for soil classification and sampler type.	n chart																
	90																				E
	=																				Ħ
	Ξ																				
	Ξ																				
195.26	90																				E
	=																				
	$\equiv$																				E
2	-																				E
2/20/1	Ξ																				E
GLB	₫																				
₩ 100 36	OF _																				
190.26	95																				E
DO01	$\equiv$																				
ARUP	Ξ																				
GPU	$\exists$																				
8 ~																					E
CHSI	=																				
മ ⊔_ 185.26	100																				
HSH HSH HSH HSH HSH HSH HSH HSH HSH HSH								-											-		
90-90									REPORT T BORING		CO	<u>R</u> D								DLE ID 0005R	
OLE L									DIST.	COL	INTY		ROL	JTE	P	OSTN	/ILE		EA	<u> </u>	
1.0.3 BOREHOLE LOG - CHSTP F-B CHSR_F-B.GPJ ARUP DOTR LIBRARY.GLB 2/20/12			LIFORNIA		M ARUP			F	PROJECT Californ	OR B	RIDG	E NA	ME ed Ti	rain							
0.3 BC	Н	igh-	Speed Rail Autho	ority CALIFORN	IA HIGH-SPEET	TRAN			BRIDGE N			PF	REPAR	ED B		rr- :-		DA	TE	SHEET	
∟												⊥υ	. Мас	յց։/ Լ	. Uu	ıran		<u> </u>	20-12	2 5 of 5	

	ECT NAI		h Chood Troin Eros	ana ta Bakarafiald																MBER	
LOGG	ED BY	•	BEGIN DATE	sno to Bakersfield COMPLETION DATE					TION (La								H	OLE IE		<u> </u>	
	Booden	-	Oct-13-11 CTOR/DRILLER	Oct-13-11					1 / E632	25497	'.45	5 (N	latior	nal G	rid)				06R	EVATION	
	gg/D. S				IN-SIT	UI	IES I	ING												VATION VAVD88)	
	ING ME				DRILL			`												IAMETER	
	-		ROTARY(5'-81.5') AND SIZE(S) (ID)		Mob SPT H				PE/HAMM	IER IC	)						_	3.75 i AMME		ICIENCY, ERI	
SPT	(1-3/8	')			Auto	m	atic	, 140	0 lbs, 30	O-incl	n dro	•					8	38%			
	HOLE B. t ceme		ILL AND COMPLETION		GROU READI			TER	DURING Not Re			3 A		DRIL ot Rec		(DATE	<i>'</i>   '	OTAL 81.5 f		H OF BORING	
1100	COCITIC	nt gi	- Cut						- Not No	Journal			.,		oraca		'				Т
		Sic				on	er	Œ			Ē			Moisture Content (%)	(6)	Plasticity Index (%)		Shear Strength (tsf)	5		
رft) ر		Grap				ocat	dumb	)epth	ır 6 in.	(bl/ft)	on (ir	(in) /	(%) H	Cont	mit (%	Inde	(%)	rengt	letho epth		
Elevation (ft)	Depth (ft)	Material Graphics				Sample Location	Sample Number	Sample Depth (ft)	Blows per	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	sture	Liquid Limit (%)	sticity	Organics (%)	ar St	Drilling Method Casing Depth	Remarks/	
Ele	O Del	Mat		Description		San	_		Blo	Ż	_	_	200	Moi	Lig	Plas	Org	She	Cas		
		0.00	ASPHALT (8") (AC).	NII) (A.D.)		000	S01	0			60	60							{{	Hand auger to 5.0'	
			AGGREGATE BASE (8	, , ,	brouge:	100															Ħ
	3		moist; medium; subrour	ith SILT (SP-SM); loose; l nded; rapid dilatancy; [FIL	L].	100															
	<u></u>					1000							13.9						$ \mathcal{Y} $		
	5					100													}		
	=					100													{}		
282.64	5					200	000	5	0.0.4	-	40	18							1		
	3					M	S02	5	2-3-4	7	18	18									
						Δ		6.5													E
			medium; subrounded; li	y dense; reddish brown; v ittle SILT; slow dilatancy;		M	S03	6.5	22-50-51	101	18	18							000000000000000000000000000000000000000		
			calcite seams [ALLUVIL	JM].		Λ	\	8													
						M	S04	8	16-25-24	49	18	16									
			Grades medium dense;	; no calcite seams; some	SILT.	$\Lambda$	ļ	9.5					43.8								
277.64	10					$\bigvee$	S05	9.5	14-13-10	23	18	15									
	3					$\Lambda$	ļ	11													
						$\bigvee$	S06	11	7-7-7	14	18	16									
	=					$\mathbb{N}$	,	12.5													
0/15			Grades dense.			$\bigvee$	S07	12.5	7-17-27	44	18	15									
3 2/2(	3		13.25', dense; olive bro	wn and reddish brown; fir	ne; few	$\Lambda$	ļ	14													
Y.GLI	目		SANDY SILT (ML); hard	d; brown to reddish brown	n; wet;	$\bigvee$	S08	14	10-16-15	31	18	14									
272.64	15		slow dilatancy; calcite s	eams.		$\Lambda$	ļ	15.5					68.2	21.9							
X 그																					
P D0																					
ARL																					
3.GPJ																			000000000000000000000000000000000000000		
ι <u>τ</u>	]																				
SH2																					Ħ
1.0.3 BOREHOLE LOG - CHSTP F-B CHSR F-B.GPJ ARUP DOTR LIBRARY GLB 2/20/12  1.0.3 BOREHOLE LOG - CHSTP F-B CHSR F-B.GPJ ARUP DOTR LIBRARY GLB 2/20/12  1.0.3 BOREHOLE LOG - CHSTP F-B CHSR F-B.GPJ ARUP DOTR LIBRARY GLB 2/20/12	20																				H
CHST			(continue	d)				T.	DEDODT:	TIT'									1.22	N E ID	_
90								E	REPORT BORING	Ģ RE					,				S	OLE ID 0006R	
OLE I			IEOD) " 1					[	DIST.	COL	JNTY	,	RO	UTE	F	POSTN	/ILE		EA		
	<b>2</b> C	Al	LIFORNIA	URS HMM	ARUP				PROJECT Californ					rain	-						
0.3 BC	Hi	gh-S	Speed Rail Author	rity California H	GH-SPEED TR	RAN			BRIDGE N			PF	REPAF	RED B		urre =		DA	TE	SHEET	-
												ļυ	. ıvıa	ggi/T	. UU	ııran		<u> </u>	20-12	2 1 of 5	

PROJE <b>Cali</b> 1	forni	a Hic	h-Speed Train Fresno to Bakersfield													_   1	1315	T NUN <b>77-00</b>		_
OGGI N. G			BEGIN DATE COMPLETION DATE Oct-13-11 Oct-13-11					TION (La · / E632									OLE 11	06R		
			ACTOR/DRILLER	IN-SIT							- (			-,		SI	URFA	CE ELE	EVATION	_
Greg	-			PD::::	D'C											_		•	NAVD88)	_
ORILLI AUG			ROTARY(5'-81.5')	DRILL													окен 3.75 і		IAMETER	
SAMPL	ER T	PE(S	) AND SIZE(S) (ID)	1				PE/HAMN								H	AMME		ICIENCY, ERI	-
SPT			FILL AND COMPLETION					) lbs, 30			•	CTCC	וחם ו	LINIC	/DATE		88%	DEDTI	H OF BORING	_
Neat				READ			EK	Not Re			) F		ot Rec		(DATE		31.5 1		TOF BURING	
													(%)		_		£			
Elevation (ft)	Depth (ft)	Material Graphics	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	S
	-20- 		SILT with SAND (ML); stiff; brown; wet; little fine slow dilatancy.	SAND;	M	S09	20	3-4-6	10	18	13							Q		
262.64	25		25' grades to hard; rapid dilatancy; reddish oxidize parting; little medium to coarse SAND.		X	22	25 26.5	18-24-51		18	15	75.2	22.8					000000000000000000000000000000000000000		
252.64	35		SILTY SAND (SM); dense; grayish brown; wet; fir medium; interbedded with SILT; rapid dilatancy.  Poorly graded SAND (SP); medium dense; brown medium; subrounded; trace fines; rapid dilatancy.	ı; wet;	X	S12	30 31.5 35 36.5	6-13-15	28	18	15	20.7	-					<u> </u>		
	3	Ш	SANDY SILT (ML); very stiff; brown; wet; fine; slo		$\exists$			10-15-19	34	18	18									
			dilatancy.		$ \chi $		20					71.5	25.8							
	=		SILTY SAND (SM); medium dense; reddish brown fine to medium; some SILT; rapid dilatancy.	n; wet;		S14		11-12-11	23	18	17	32.6								
	$\equiv$			_,	A		39.5	0.10.10		10	45	32.7	10.0							
247.64	40		SILTY SAND (SM); dense; reddish brown; wet; fir	ne to	X.	S15 3	39.5	9-13-19	32	18	15									-
			(continued)				Ι-	EPORT	דודי ר									110	DLE ID	_
							E	ORING	Ģ RE	ECC								S	0006R	
_							D	IST.	COL	JNTY	,	RO	UTE	F	POSTN	ΛILE		EA		
	<b>(</b>		LIFORNIA URS HMM IA	ARLIP				ROJECT					·							
	Н	liah-	Speed Rail Authority	DH - SPEED TO	RAN									Υ			DΛ	TF	SHEET	-
	Н	ligh-	Speed Rail Authority	H-SPEED TO	RAN		C	Californ	ia H	igh-	Spe PF	ed T	rain RED B ggi/7		ırran			TE 20-12		

•	ì	•	
		•	
ľ	r	•	
Ć	ſ,	)	
	I		
	١	•	
ľ	Y		
	ı		
Ç	•	)	
	>		
	=	)	
	,	,	
	L		
		١	
	4		
	'		
		•	
Ċ	<b>\</b>		
	Ì	5	
	<u>`</u>	÷	
	=	•	

PROJECT NAME  California Hi  LOGGED BY	gh-Speed Train Fre BEGIN DATE	sno to Bakersfield COMPLETION DATE	BOREHO	LEL	OCA	TION (La	t/Lona	or No	rth/E	ast a	nd Da	tum)		1		CT NUN <b>77-00</b> D		_
N. Goodenow	Oct-13-11 RACTOR/DRILLER	Oct-13-11		688	.474	/ E632								SI	300 JRFA	06R CE ELE	EVATION NAVD88)	_
DRILLING METHO	OD		DRILL RI											В	OREH	IOLE D	IAMETER	
SAMPLER TYPE( SPT(1-3/8")	), ROTARY(5'-81.5') S) AND SIZE(S) (ID) KFILL AND COMPLETION grout		Mobil E SPT HAM Autom GROUNE READING	IMEF atic,	R TYF , 140	) lbs, 30	)-inch	n drop LING			DRIL		(DATE	H/ 8	38%	R EFF	ICIENCY, ERI	
Elevation (ft) Depth (ft) Material Graphics	[	Description	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	i
242.64 45	medium; subangular to slow dilatancy; modera	subrounded; trace GRAV te cementation.			41					39.5	11.2							
242.64 45	dense; reddish brown;	ith SILT (SP-SM); mediun wet; medium; subangular few GRAVEL; slow dilata	to X	S16	45 46.5	8-12-14	26	18	13	10.6								
237.64 50	50.0', grayish brown; w few GRAVEL; rapid dik	et; fine to medium; subrou atancy.	unded;	S17	50	11-13-13	26	18	14	6.4	14.2					$\sim$		
232.64 55	55.0', very dense; brow few fines; slow dilatanc	n; wet; medium; subround y.	ded;	S18	55 56.5	12-21-32	53	18	18									
-227.64—60	(continue	d)																_
					E	REPORT BORING	G RE		RD							S	DLE ID 0006R	
CA	LIFORNIA -Speed Rail Autho	URS HMM	ARUP		F	OIST. PROJECT Californ	OR B	gh-S	pe	ME ed T			POSTN	ИILE		EA		_
righ	-эрееа кан Анто	CALIFORNIA HI	LIFT SPEED TRAIN		В	RIDGE N	IUMBE	R			RED B ggi/T		rran		DA 2-	TE 20-12	SHEET 3 of 5	į

Cali	ECT N		h-Speed Train Fre	sno to Bakers	sfield												_   1	315	77-00	MBER )
LOGG	SED BY Soode		BEGIN DATE Oct-13-11	COMPLETION Oct-13-11	DATE   BOF	REHC 2154	DLE L 1688	OCA .474	TION (La I / E632	t/Long 25497	or N '.455	orth/l 5 (N	East a <b>latio</b> r	nd Da nal G	tum) rid)			OLE 10		
	ING CO		ACTOR/DRILLER		IN-S	ITU	TEST	ING												EVATION NAVD88)
DRILL	ING MI	THO	)		I .	LL RI											В	OREH	OLE [	DIAMETER
			ROTARY(5'-81.5')  AND SIZE(S) (ID)				B-80 //MEF		PE/HAMN	IER ID	)							3.75 i AMME		FICIENCY, ERI
SPT	(1-3/8	3")			Αι	ıtom	atic	, 140	) lbs, 30	0-incl	n dro	•					8	38%		
	HOLE t cem		FILL AND COMPLETION rout			DINC		TER	DURING Not Re			6 A			LING orded	(DATE		ЭТАL 31.5 f		H OF BORING
					,									(%)		(%)		sf)		
£		Material Graphics				cation	mber	Sample Depth (ft)	i.	Œ	(ii)	(L	(%)	Moisture Content (%)	(%)	Plasticity Index (%)	(%)	Shear Strength (tsf)	pod 4	
Elevation (ft)	(ft)	ial Gr				le Loc	le Nu	le De	ber 6	lq) ən	ration	/ery (i	/ash (	le C	Limit	city In	%) soir	Stre	g Met	
Eleva	Depth (ft)	Mater	[	Description		Sample Location	Sample Number	Samp	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moist	Liquid Limit (%)	Plasti	Organics (%)	Shear	Drilling Method	Remarks/ Other Tests
	<b>-</b> 60		Poorly graded SAND (Smedium; subrounded;		rown; wet;	V	S19	60	45-75-63	138	18	13	- 1							
	=		SILTY SAND (SM); ver slow dilatancy.		ne; little SILT;	7/	1	61.5											MMM	
	=		olon anatanoy.																	
																			000000000000000000000000000000000000000	
	=																			
222.64	65		65.0', reddish brown; fi	ne to medium; sub	orounded; little	/	S20	65	26-34-34	68	18	13								
	=		fines.			X	1	66.5												
	<u> </u>																			
	=																			
217.64	70-		70.01	San della sadena			004	70	04.47.50	07	40	40								Ded hedding 4/4
			70.0', medium; red hor	izontai partings.		X	S21	70	24-47-50	97	18	13								Red bedding 1/4 thick (horizontal bedding
	Ξ						y	71.5												experienced at 70.67' to 70.75'; three well defined
	=																			red hematite oxidation zones
	=																			
	_																			
212.64																				
212.64	75		SILT with SAND (ML); subangular; some fine			·	S22	75	26-50	50/ 3"	9	9							200000000000000000000000000000000000000	PP: 1.0 tsf
			dry strength; no dilatan					76.5											)))))	
																				PP: 1.0 tsf
																			) JUJU	1 F. 1.0 (8)
-207 64																			000	
<b>-</b> 207.64	80-		<i>I</i>	/\																
			(continue	ea <i>j</i>				F	REPORT T	TITL F									Н	OLE ID
								E	BORING	G RE	CO			UTE		OSTN	/II F			0006R
207.04	> (	^ ^	I IEODNII A	LIRS	HMM ARUP									U1E		J311	VIILĒ			<b>1</b>
			LIFORNIA Speed Rail Autho	rity =	LEDENA HER CO	Terra			ROJECT	ia Hi	igh-	Spe	ed T		.,			1		0.:===
		igii-	opeeu kuli Aumo	iny Co	- CONTRACTORIES	- reari		E	RIDGE N	NUMBE	±R	PF D	REPAR . Ma	κED B ggi/Ί	Υ Γ. <b>C</b> u	rran		DA 2-	TE 20-1	SHEET 2 4 of 5

	_	_	
7	ì		
	·	•	
		_	
•	٠		
ľ	Y	_	
	•	5	
	<u>,                                     </u>	′	
	I	_	
	1		
L	ī		
,	V	,	
	•	-	
	ı	ı	
Ę	•	,	
		-	
	2		
	-	1	
	=	ζ	
L		J	
	2	2	
ī	ī	7	
	•	•	
	_	)	
ŕ	-	١	
	2	2	
•	Į	ί	
	•	4	
١		•	
ţ		)	
Ć		1	
	2	:	
١	?	?	
١	•	1	
i	è	ì	
	Ė	′	
١	_	)	

	ECT NA fornia		h-Speed 1	Γrain Fra	esno to	Bakersfield														315		IMBER O	
LOGG	ED BY	_	BEGIN	I DATE 13-11	COM	PLETION DATE -13-11					TION (Lat								Н	DLE II	)		
DRILL	ING CC	NTRA	CTOR/DRILL		OCI	-10-11	IN-SIT				· / EU32	) <del>+</del> 3/	.+00	, (IV	auul	iai G	iiu)		_	JRFA		EVATION	
	gg/D.						DD":	Dic														(NAVD88)	
	ING ME SER(0		) ROTARY(	5'-81.5')			DRILL Mob													DREH 3.75 i		DIAMETER	
SAMP	LER TY	PE(S)	AND SIZE(S				1				PE/HAMM			<u> </u>					H/	AMME		FICIENCY, ER	i
	(1-3/8 HOLE I		FILL AND CO	MPLETION	N .		1				) lbs, 30 DURING			-	FTER	DRILI	LING (	DATE	- 1	38% OTAL	DEPT	H OF BORING	<u> </u>
	t cem				•		READI				Not Red					ot Rec				1.5 f			
																(%)		(%		(JS			
Œ		aphics						ation	nber	oth (#	.⊑ਂ	Œ	(in)	٦	(%	ntent	(%)	) xəp	<u> </u>	igth (1	ا موا		
ion (f	(#	al Gre						e Loc	P Nur	e De	per 6 in.	le (bl/	ation	ery (ii	ash (	e S	Limit	iţ	%) sɔ	Strer	Met		
Elevation (ft)	Depth (ft)	Material Graphics			Description	on		Sample Location	Sample Number	Sample Depth (#)	Blows	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method	Remarks/	
	-80	<u>≥</u> 	Grades red			OII			_		13-19-16	35	18	8	7	2		<u>п</u>	0	S		Other Test	.5
	_		Poorly grad	 led SAND (	SP); den:	 se; grayish brown		-	R	1.5											MMM		
	=		medium.																		Ø		_
			For corrosic		of 81.5' on 10/13/	∠017.																Ē	
	85		Soil moistur			mnles																	
	Ξ		became we drilling fluid.	t durina ret	trieval thr	od <sup>.</sup>																E	
	Ξ		used as an free ground	indication (	of a poter	ntial phreatic surfa	ice or																
202.64	85		ū			oil classification c	hart																Ē
	=		and key to t																				F
	Ξ																						
	$\equiv$																						
	Ξ																						F
	∃																						
197.64	90																						
197.04	90-																						E
	$\equiv$																						E
	$\equiv$																						
!	=																						F
																							E
	=																						
192.64	95—																						E
	Ξ																						
	=																						Ē
	=																						F
	₫																						E
																							E
																							Ē
<b>-</b> 187.64	100																						
										□	EPORT T	TTI F									Н	OLE ID	
-187.64 <sup>4</sup>										В	ORING	RE		RD	DO	ITE		OCT*	/II =		_ \ S	30006R	
		- A		K II A		URS HMM	ADI ID				IST.	COU			ROI	JIE		OSTN	/IILE		E	<b>~</b>	
			LIFOR			LIKE HIMM					ROJECT Californ	a Hi	gh-8	Spe	ed T								
<b>~</b>	Н	igh-	Speed Ra	II Autho	ority	CALFORNA HO	H-SPEED TH	RAIN		В	RIDGE N	JMBE	R	PR	REPAR	RED B ggi/T	Y . Cu	rran		DA 2-	TE 20-1	SHEET 5 of	5
														_									

Calif	ECT NAME fornia H ED BY Goodenov	igh-Speed Train Fresno to Bakersfie BEGIN DATE COMPLETION DAT	TE   BORE			TION (La 5 / E632								1	ROJEC 13157 DLE ID 8000	7 <b>7-0</b>	
	NG CONT	RACTOR/DRILLER Iders	IN-SI	TU TES	TING									SI	JRFAC	E EL	EVATION (NAVD88)
AUG SAMPL SPT BORE	LER TYPE (1-3/8") HOLE BAC	(S) AND SIZE(S) (ID)  EKFILL AND COMPLETION	SPT I	DII B-8 HAMME OMATIC	R TYI ;, 14	PE/HAMM 0 lbs, 30 DURING Not Re	)-inch	n dro	•		DRIL		•	H/ { }	3.75 i AMME 38% OTAL I	n R EF	FICIENCY, ERI
iveat	cement	grout	. 12 13			Not Re	Cordec			IN	ot Rec	orueu			31.5 f		
Elevation (ft)	Depth (ft)	-		Sample Location Sample Number		Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method	
		ASPHALT (6") (AC).  AGGREGATE BASE (6") (AB).  SILTY SAND (SM); medium dense; brown; n medium; subrounded; few fine GRAVEL; rap dilatancy; no cementation; [FILL].	noist; id	so	0			60	60	30.8							Hand auger to 5.0' to confirm no utilities
280.11	5	Poorly graded SAND with SILT (SP-SM); ver brown to reddish brown; wet; fine; little SILT; coarse SAND; slow dilatancy; moderate cem calcite layers 1/2 to 3/4" thick [ALLUVIUM].  5.0' - 6.3', calcite seams.	few	S02	6.5	52-96-50	146/ 9"	15	15	32.6	10.3						
		7.0', grades dense; without calcite; weak cen	nentation.	S03	8	21-42-70	112	18	17	37.2	11.1						
275.11	10-	9.5', grades medium dense.		Sos	9.5	6-7-10	17	18	13	30.9	13.6						
		11.0', grades dense; frequent calcite seams.		Soc	11 11 12.5	8-21-19	40	18	13								
		12.2' - 14.0', calcite seams.		Son	12.5		31	18	14	30.4	19.9						
270.11	15	14.0', grades very dense.		SOE	15.5		71	18	15	40.7	14.1					<u>0000000000000000000000000000000000000</u>	
265.11	20															200000000000	
		(continued)				REPORT T	TIT! F									ц	OLE ID
Œ	<b>≥</b> C4	ALIFORNIA TURSIM	MM ARUP		[	BORING DIST. PROJECT	COL	JNTY			UTE	F	POSTM	MILE		5	60007R A
	Hig	ALIFORNIA n-Speed Rail Authority	NA HIGH-SPEED T	RAN	(	Californ BRIDGE N	ia Hi	gh-	Spe PF	ed T REPAF	rain RED B ggi/T		ırran		DA <sup>-</sup>	TE 20-1	SHEET 2 1 of 5

Calif	ECT NA <b>fornia</b> ED BY	a Hig	h-Speed Train Free	esno to Bakersfie COMPLETION DA	eld	EUC	NEI	004	TION (La	nt/Long	a or N	orth/	Foot o	nd Do	hum)		1		77-00		_
N. G	ooder	now	Oct-14-11 ACTOR/DRILLER	Oct-14-11		152	086	.945	5 / E632								S	3000	)7R	VATION	_
_	gg/D. S				DRIL	I DI	G										_			IAVD88) AMETER	
AUG	SER(0	'-5'),	ROTARY(5'-81.5')		Мо	bil I	B-80										3	3.75 i	n		
	LER TY (1-3/8		) AND SIZE(S) (ID)						PE/HAMN 0 lbs, 3			op						AMME 38%	REFFI	CIENCY, ERI	
BORE	HOLE E	BACKE	FILL AND COMPLETION	N	l l	UNE	DWA <sup>-</sup>		DURIN	G DRII	LLING	-				(DATE	) TC	OTAL		OF BORING	_
iveat	t ceme	ent g	Tout		1 1 1				Not Re	ecorde			IN	ot Rec	oraea		8	1.5 f	τ 		-
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location	Sample N	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
			SILTY SAND (SM); more to medium; rounded to dilatancy; weak cemer	o subrounded; few SILT	brown; fine T; rapid	X	S09		5-7-8	15	18	13	7.4						000000000000000000000000000000000000000		
			21.5', some SILT.	itation.			3	21.5					30.4						2000		
	=																				
	=																				
	=																				
60.11	25																				
00.11	25		25.0', grades dense.			$\setminus$	S10	25	18-13-17	30	18	14									
						Υ.	4	26.5													
																			200		
	3		SILTY SAND (SM); de SILT; slow dilatancy.	ense; olive brown; wet;	fine; some																
	=																				
55.11	30		SILT with SAND (ML); SAND; slow dilatancy.	hard; olive brown; wet	t; little	$\frac{1}{\sqrt{2}}$	S11	30	7-11-30	41	18	17	84.2	29.7							
	=		SILTY SAND (SM); de	ense; brown; wet; fine t LT; slow dilatancy; redo	o medium;	- []\		31.5						14.1							
	=		oxidation seams.	_1, slow dilatarity, redu	JISIT DIOWIT																
	$\exists$																				
																			200		
50.11	35			n brown; fine SAND; w	eak	\ /	S12	35	12-12-15	27	18	14									
	=		cementation.	,		X	4	36.5					30.5								
	<u>=</u>																				
																			000000000000000000000000000000000000000		
	=																				
	=																				
45.11	40																		Œ		_
			(continue	ed)				1 -	DEDOOT.	TIT' -									1	I E ID	_
								E	REPORT BORIN	G RE	ECO		1						S	LE ID 0007R	
		- A		D. mailin	AA AD D			L	DIST.		JNTY			UTE	F	POSTM	1ILE		EA		
		A	LIFORNIA Speed Rail Autho	URS H	MM ARUP				PROJECT Californ	nia H	igh-	Spe	ed T								
	Н	ıgh-	Speed Rail Autho	Ority \Calfor	INA HIGH-SPEED	TRAN			BRIDGE 1			PF	REPAF	RED B'		ırran		DA <sup>2</sup>	TE 20-12	SHEET 2 of 5	

PROJECT NAME  California High-Speed Train Fresno to Bakersfi	eld											_   1	3157	7-00	MBER )	
LOGGED BY BEGIN DATE COMPLETION DA N. Goodenow Oct-14-11 Oct-14-11				TION (La 5 / E632								- 1	OLE ID			
DRILLING CONTRACTOR/DRILLER Gregg/D. Selders	IN-SIT	U TES	TING									2	285.1	1 ft (I	EVATION NAVD88)	
DRILLING METHOD AUGER(0'-5'), ROTARY(5'-81.5')	DRILL	. RIG oil B-80	n												IAMETER	
SAMPLER TYPE(S) AND SIZE(S) (ID) SPT(1-3/8")	SPT H	IAMME	R TYI	PE/HAMM 0 lbs, 30			op					H	3.75 ii AMME 38%		FICIENCY, ERI	-
BOREHOLE BACKFILL AND COMPLETION	GROU READ		TER	DURING			6 A				`	<b>'</b>			H OF BORING	_
Neat cement grout	READ	INGS	1	Not Re	cordec	<u> </u>		N	ot Rec	orded		8	1.5 f	<u> </u>		_
Elevation (ft) Depth (ft) Material Graphics		Sample Location Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth		
		S13	40	8-16-24	40	18	17							M	PP: 3.25 tsf TV: 5.0 tsf	
SILTY CLAY with SAND (CL); hard; reddish wet; some SILT; some SAND; medium plast medium dry strength; low toughness.	ticity;		41.5					74.8	17.8	41	26					
SANDY SILT (ML); very stiff; reddish brown grayish brown; some fine SAND; weak ceme	and entation.	S14	46.5	8-12-17	29	18	15	68.2	28.6						PP: 1.5 tsf TV: 2.0 tsf	
SILTY SAND (SM); medium dense; brown; v medium; subangular; some SILT; weak cem	wet; fine to lentation.	S15	51.5	9-12-12	24	18	18	17.6								
SANDY SILT (ML); very stiff; light brown; we fine SAND; slow dilatancy; weak cementation	et; some n.	S16	56.5	5-7-11	18	18	18	59.5								
225.11 60 (continued)														<u>Ø</u>		-
(continued)				REPORT	TITLE									Н	DLE ID	_
			E	BORINO DIST.	Ģ RE	CO JNTY		RO	UTE	F	POSTI	MILE			0007R	_
CALIFORNIA High-Speed Rail Authority	MM   ARUP	RAN	(	PROJECT Californ BRIDGE N	nia Hi	igh-	Spe	ed T	rain RED B	<u> </u>			DA	TE	SHEET	-
				- 100F I	-OIVIDE	_, `			ggi/T		ırran		2-2	20-12	2 3 of 5	,

	ECT NA		h-Speed Train Fre	sno to Bakersfield															T NUN		
LOGG	ED BY	_	BEGIN DATE	COMPLETION DATE	BORE	HO	LE L	OCA	TION (La	t/Long	g or N	orth/l	East a	nd Dat	tum)		Н	DLE ID	)		
	Soode ING CO	_	Oct-14-11 ACTOR/DRILLER	Oct-14-11	IN-SIT				5 / E632	7473	3.99	) (I\	latior	iai Gi	ria)			JRFAC		VATION	
Gre	gg/D.	Selde	ers														2	285.1	1 ft (N	NAVD88)	
	ING ME		O ROTARY(5'-81.5')		DRILL			)										DREHO 3.75 iı		AMETER	
			) AND SIZE(S) (ID)		SPT F	IAN	IMEF	RTYF	PE/HAMN								H/	AMME		ICIENCY, ERI	
	(1-3/8		FILL AND COMPLETION						0 lbs, 30			•		- DDII I	1110	DATE	- 1	38%	DEDTI	LOE BODING	
	t cem				READ			IEK	DURING Not Re			, A		DRILI		DATE		31.5 ft		OF BORING	
														(%)		<u></u>					
		Material Graphics				ation	per	Sample Depth (ft)	ے	_ ₽	Ē.		(6)	Moisture Content (%)	(%)	Plasticity Index (%)		Shear Strength (tsf)	ا ا		
on (ft	Œ.	l Gra				Location	Nun	Dep	er 6	) (bl/f	tion (	ıry (in	() ysi	e Co	imit (	y Ind	%) s:	strenç	Meth		
Elevation (ft)	Depth (ft)	ateria				Sample	Sample Number	mple	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	oistur	Liquid Limit (%)	asticil	Organics (%)	ear S	Drilling Method Casing Depth	Remarks/	
Ш		Ĕ		Description use; brown; wet; fine; some	2	Sa	S17	eS 60	面 18-14-24	38	18	18	70	Ĭ	Ë	Ĕ	ō	ည်	اقاق	Other Tests	$\perp$
	=			erbedding of SILT; no dilate		IV.							41	17.5							
	$\exists$		Would be me made in			$\Lambda$		61.5					41	17.5							Ш
	=																				Ħ
	=																				
																					Ħ
220.11	65		SANDY SILT (ML); hard	d: reddish brown: wet:			S18	65	13-20-28	48	18	18									
				D; trace fine GRAVEL; mo	ottled	Ŋ				10	10	10	50.4	47.0							
			nemane stanling.			$\Lambda$		66.5					50.1	17.9							
	=																				H
	₫																				E
	$\equiv$																				
	=																				
215.11	70-						0.10		0.44.05		10	40									E
	$\exists$					M	S19	/0	6-14-25	39	18	18									
	Ξ					$\Lambda$		71.5													Ħ
	=																				
7.	$\equiv$																				
2/20/																					Ħ
GLB	=																				
%AR 340 44	75																				
210.11	/5			own subhorizontal seams ilatancy; weak cementatio		$\bigvee$	S20	75	16-20-50	70	18	14									
DOTA	=		g,			$\Lambda$		76.5					51.5	22.4							Ħ
ANDP ANDP	$\exists$																				
r Cli	=																				
7-B.C																					
HSR	Ξ																				Ħ
0 8 4																					
205.11	<b></b> 80 <b></b>		(continue	d)		-					1										
to large									REPORT			DD								LE ID	
) ELO									BORINO DIST.		JNTY		RO	UTE	P	OSTM	1ILE		EA	0007R	
1.0.3 BOREHOLE LOG - CHSTP F-B. CHSR_F-B.GPJ. ARUP DOTR LIBRARY.GLB 220/12  1.1. 97	<b>A</b> (	Δ	LIFORNIA	LIRS HMM	ARUP			F	ROJECT	ORF	RIDO	SE NA	AMF								_
BOR W			Speed Rail Author	CALECUMA HE	H-SPEED T	RAN		(	Californ	ia H	igh-	Spe	ed T		.,			T 5		0,1557	
1.0.3	"	911-	opeca Kali Auliloi	117	and the state of			E	BRIDGE N	IUMBI	ΕK			RED B'		rran		DA1 2-2	re 20-12	SHEET 4 of 5	

	Ξ	_	
	ì	ı	
١	•	_	
١		_	
ĺ	ì	_	
ĺ	1	5	
	Ť	-	
	•	-	
ĺ	١	_	
l	ı	_	
ĺ	ì	•	
	Ċ		
į	•	)	
	5	5	
		:	
		•	
		)	
	2	_	
ı	ı	J	
ĺ	_	١	
ĺ	_	٦	
	_	7	
١	-	4	
ĺ	•	1	
١	•	-	
ļ	Ξ	?	
١	_	4	
ĺ	3	5	
ĺ	•	1	
į		5	
į	Ē	5	

	ECT NA fornia		h-Speed Train Free	sno to Bakersfiel	d														T NU	MBER 1	
LOGG	ED BY	_	BEGIN DATE	COMPLETION DATE	E BORI				TION (Lat								Н	OLE II	)	-	
	Soode		Oct-14-11 ACTOR/DRILLER	Oct-14-11	IN-SI				5 / E632	7473	.995	) (IV	ation	iai G	ria)		_		07R CE EL	EVATION	
Gre	gg/D.	Selde	ers														2	285.1	1 ft (	NAVD88)	
	ING ME		) ROTARY(5'-81.5')		DRIL	L RIG bil B												OREH 3.75 i		DIAMETER	
			) AND SIZE(S) (ID)					TYF	PE/HAMM	IER ID	)									FICIENCY, ER	li .
	(1-3/8								) lbs, 30			-						38%			
	t ceme		FILL AND COMPLETION rout		GRO   REAL			ER	DURING Not Re			i A		DRILI ot Rec		DATE		31.5 f		H OF BORING	ì
		Ĭ			-									(%)		<u> </u>					$\Box$
		hics				tion	Ser	ر#) ر	۔		<u>c</u>			Moisture Content (%)	(%	Plasticity Index (%)		Shear Strength (tsf)	_ او		
n (ft)	£	Material Graphics				Sample Location	Sample Number	Sample Depth (ft)	per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Con	Liquid Limit (%)	/ Inde	Organics (%)	treng	Drilling Method Casing Depth		
Elevation (ft)	Depth (ft)	erial				nple	nple	nple	Blows pe	alue,	etrat	over	Was	sture	μ	sticity	anics	ar S	ling N	Remarks/	,
当	_0e _08	ğ Z		Description			_						200	Mo	Γį	Pa	O D	S		Other Test	
	Ξ		SILT with SAND (ML); he frequent dark reddish be				S21	80	29-50-67	117	18	13	77.3	29.3					MANNA		E
	∃					$\mathbb{H}$	8	31.5					11.5	29.5							
	85		Borehole terminated at	a depth of 81.5' on 10/	14/2011.																E
	=		For corrosion test result	ts, see Appendix E.																	
	Ξ		Soil moisture indicated	as "wet" because SPT	samples																E
	=		became wet during retri drilling fluid. Soil moistu	ure indication should no	ot be																F
200.11	85		used as an indication of free groundwater table.	r a potentiai phreatic su	irrace or																
200.11	=		See Borehole Log Lege		n chart																
	$\equiv$		and key to test data and	d sampler type.																	E
	Ξ																				þ
	Ξ																				E
	Ξ																				F
	∃																				E
105.44	=																				Ė
195.11	90-																				
	=																				F
	Ξ																				
,	=																				F
1020	$\equiv$																				Ē
3LB 4	Ξ																				Ė
ARY.	Ξ																				
190.11	95																				Ē
Ž	∃																				
	∃																				Ė
2	$\exists$																				E
2	=																				F
ξ.	$\equiv$																				
<u>5</u>	$\exists$																				E
185.11	100																				
5									REPORT 1											OLE ID	
									BORINO DIST.		CO INTY	RD	ROI	JTE	P	OSTN	ИILE		S E/	60007R A	
	> (	· A	LIFORNIA	URS HMM	1 ARLIP				ROJECT			- F F I				11					
1.0.3 BOREHOLE LOG - CHS/I 7-8.6F9 AROP DO IX LIBRARY GLB ZIZO/I 2			LIFORINIA Speed Rail Author	7					Californ	ia Hi	gh-S	Spe	ed T		_						
	П	ıgn-	speed Kali Aumor	IIY CALFORNA	- FREN - SPEED	TRANS.		В	RIDGE N	UMBE	R		REPAR			rran		DA 2-	TE 20-1:	SHEET 2 5 of	5

Calif	ECT NAM <b>fornia</b> ED BY		h-Speed Train Fresno to Bakersfield BEGIN DATE COMPLETION DATE	<b>d</b> BORF	HOLF	E LOCA	ATION (La	at/Lond	or N	lorth/	East a	nd Da	tum)		_   1	13157 OLE ID	77-0	JMBER <b>0</b>
N. G	ooden		Oct-17-11 Oct-19-11	N21	15092	21.78	4 / E632								3	3001	10R	
	ING CON		CTOR/DRILLER ers			STING	zomete	r PS	Loc	naina					- 1			EVATION (NAVD88)
DRILLI	ING MET	HOD		DRILL	RIG		Zomete	1, 73	LUÇ	i in i	1							DIAMETER
			ROTARY(5'-165')		oil B-										_	3.75 i		
	LER TYP (1-3/8")		AND SIZE(S) (ID)				PE/HAMN 0 lbs. 3			go					- 1	AMME 38%	R EF	FICIENCY, ERI
			ILL AND COMPLETION	GRO	JNDW	ATER	DURING			•	FTER	DRIL	LING	(DATE	- 1		DEPT	H OF BORING
Piez	ometer	_		READ	INGS		Not Re	ecorde	d		N	ot Rec	orded		1	65 ft		
Elevation (ft)	Depth (ft)	Material Graphics	Description			Sample Number Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method	1
		000	ASPHALT (8") (AC).		5000 -0000	01 0			60	60								Hand auger to 5.0'
			AGGREGATE BASE (4") (AB).  SILTY SAND (SM); brown; moist; fine to mediu	m; rapid	(2)													
	<u> </u>		dilatancy; [FILL].		000													
					00						22.3						}	
	5				000													
					00	5											{{	
281.12	5-				S	02 5	5-7-11	18	18	18							1	
			SILTY SAND (SM); medium dense; brown; moi	iot: fino	- XI-						24.4	4.8					000	
	1		to medium; [ALLUVIUM].		$\bigvee_{s}$	6.5	10-21-27	48	18	17	24.4	4.0					000	
	-		SANDY SILT (ML); hard; grayish brown; wet; fil plasticity; slow dilatancy; weak cementation.	ne; low			10-21-27	40	10	"								
			Grades wet.		$\mathbb{A}$	8	10.40.04	40	40	17								
	3				M,	04 8	10-19-24	43	18	17	57	15.9						
					A	9.5		1	10	47	37	15.5					000	
276.12	10		SANDY SILTY CLAY (CL-ML); hard; brown; we plasticity; slow dilatancy.	et; low	N <sup>s</sup>	11	14-20-24	44	18	17	52.9		27	5	3.2	_		
	#		SILTY SAND (SM); medium dense; brown; wet some SILT.	 ; fine;	s	06 11	5-7-10	17	18	17								
			Some Sici.		M	12.5	,				41.7	16.4					000	
	推		SANDY SILTY CLAY (CL-ML); hard; grayish br		s	07 12.5	14-25-24	49	18	15							100	
	=		wet; fine SAND; low plasticity; fine; mottled gray brown and brown.	yisii	$\mathbb{N}$	14					58.9/ 15.2		29	7	1.5			
			14.0', grades brownish gray.		s	08 14	10-13-16	29	18	15							<u>0000000000000000000000000000000000000</u>	
271.12	15				$\mathbb{N}$	15.5	i											
	_																	
	1																	
	=																	
66.12	_20		(continued)															
			(continued)				REPORT	TITLE									Н	IOLE ID
							BORIN	Ģ RE	CO			1175	1.	OCT*	AII F		_ 5	S0010R
	· ~	A 1	IFODA II A	I ADV			DIST.		JNTY			UTE		POST	VIILE		L	A
		Αl	LIFORNIA Greed Rail Authority	ARUP			PROJECT Californ					rain						
	Hiç	gh-S	Speed Rail Authority	HGH-SPEED T	RAN		BRIDGE N			PF	REPAR . Ma		Υ			DA	TE	SHEET

	ECT NA		h-Speed Train Fresno to Bakersfield													- 1		T NUN <b>77-00</b>		
LOGG	ED BY	•	BEGIN DATE COMPLETION DATE Oct-17-11 Oct-19-11	BOR				TION (La 1 / E632								Н	OLE II	)		_
DRILL	ING CC	NTRA	ACTOR/DRILLER	IN-SI				+ / E032	.034	1.73	<i>r</i> (1)	valioi	iai G	iiu)				10R CE ELE	EVATION	_
	gg/D.					•	Pie	zometei	r; PS	Log	gin	9							NAVD88)	
	ING ME SER(0		) ROTARY(5'-165')	DRIL Mo		с В-80	)									- 1	ЭREH 3.75 i		AMETER	
			) AND SIZE(S) (ID)					PE/HAMN								H	AMME		ICIENCY, ERI	
	(1-3/8 HOLE I		FILL AND COMPLETION					DURING				FTER	DRIL	LING	(DATE	- 1	38% OTAL	DEPTH	OF BORING	
	omete			REAL				Not Re					ot Rec		`		65 ft			_
		s			_								t (%)		(%		tsf)			
Œ		Material Graphics			Sample Location	Sample Number	Sample Depth (ft)	Ë.	Œ	(in)	(L	(%)	Moisture Content (%)	(%)	Plasticity Index (%)	<u></u>	Shear Strength (tsf)	thod		
Elevation (ft)	(#)	ial Gr			e Lo	le Nu	le De	ber	q) ən	ratior	/ery (	/ash	lre C	Ë	city Ir	ics (	Stre	g Metho g Depth		
Eleva	Depth (ft)	/later	Description		Samp	samp	samp	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Aoist	Liquid Limit (%)	Jasti	Organics (%)	Shear	Drilling Method Casing Depth	Remarks/ Other Tests	
	20 =		SILTY SAND (SM); medium dense; grayish brow brown; wet; medium; subrounded; trace GRAVE		1/	S09		9-11-13	24	18	16						0,	<del>/ -    </del>	0	╪
	∃		dilatancy; stratified; interbedded reddish brown oxidation stained pockets.	L, Slow	X		21.5					36.5/ 57.1	16.9							-
	$\exists$		oxidation stained pockets.									57.1								Ė
																				F
	$\equiv$																			
	$\equiv$																			Ė
																				E
261.12	25		SILT (ML); very stiff; grayish brown; wet; trace S medium plasticity; medium dry strength; low touch			S10	25	11-15-18	33	18	18							000000000000000000000000000000000000000		Ī
	=		mediani plasticity, mediani dry strength, low tod	gi ii 1000.	X		26.5					94.6	30.8	35	10					
																		1000		
	Ξ																			F
	Ξ																			
	=																			Ė
050.40																				
256.12	30 =		SILTY SAND (SM); medium dense; brownish gra- fine to medium; subrounded; rapid dilatancy; pri		$\overline{\ \ }$	S11	30	7-9-10	19	18	16									
	=		quartz, muscovite, and trace mafic minerals.	,	Λ		31.5					23.7	20.9							
	∃																			
	$\exists$																			
	Ξ																			
	=																			-
251.12	35																			
-02					M	S12	35	9-10-11	21	18	17									F
	$\equiv$				$\Lambda$		36.5					22.7/ 15.2	17.4							
	=																			į
	į																			-
																				Ī
	=																	000000000000000000000000000000000000000		
246.12	40-																			
			(continued)															-		
								REPORT TO BORING			RD			_		_			DE ID 0010R	
								DIST.		JNTY		RO	UTE	F	POSTN	/ILE		EA		
			LIFORNIA JURS HMM	ARUP			F	ROJECT	OR E	RIDO	SE N	AME	rain							_
	H	igh-	Speed Rail Authority	IGH-SPEED	TRAN			BRIDGE N			PF	REPAF	RED B				DA	TE	SHEET	
											D	. Ma	ggi/1	. Cu	ırran		2-	20-12	2 of 9	

	ECT NA		h-Speed Train Fres	sno to Bakersfield	1													3157		MBER 1	
LOGG	ED BY	_	BEGIN DATE	COMPLETION DATE	BORE	HO	LE L	OCA	TION (La	it/Long	or N	lorth/	East a	nd Da	tum)		Н	OLE ID	)		
	Sooder	_	Oct-17-11 CTOR/DRILLER	Oct-19-11	IN-SI				4 / E632	2034	1./3	/ (I <sup>\</sup>	vatior	iai G	iid)			SOO1	_	EVATION	
Gre	gg/D. \$	Selde	ers		Sta	ndp	ipe		zomete	r; PS	Log	ggin	<u>g</u>				2	286.1	2 ft (	NAVD88)	
	ING ME		ROTARY(5'-165')		DRILI Mol			)												DIAMETER	
			AND SIZE(S) (ID)						PE/HAMN	IER IE	)							3.75 ii AMME		FICIENCY, ERI	
	(1-3/8								0 lbs, 30			ор						38%		,	
	HOLE E		ILL AND COMPLETION		GRO! READ			ΓER	DURING			3 <i>F</i>	FTER			(DATE	' I		DEPT	H OF BORING	
Piez	omete	:1			T (L) (L				Not Re	corde			IN	ot Rec	oraea		1	65 ft			$\top$
		S				u	٦.	Œ						Moisture Content (%)		(%)		Shear Strength (tsf)			
Œ		raph				catic	əquir	abth	6 in.	( <del>J</del> )	l (F)	(ii)	(%)	onte	it (%	ndex	(%	ngth	thod		
tion	(ff)	ial G				le Lc	le Z	e De	ber .	ne (b	ratio	/ery	/ash	ure C	_ Ei	city I	ics (	Stre	g Me		
Elevation (ft)	Depth (ft)	Material Graphics	n	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	10istu	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	hear	Drilling Method Casing Depth	Remarks/ Other Tests	
	40	1	Poorly graded SAND wi	ith SILT (SP-SM); dense	;	\/	S13		13-19-17	36	18	17	7	2		<u> </u>		0)		Other rests	ŧ
	₫		reddish brown; wet; me slow dilatancy.	dium; subrounded; trace	gravel;	IX.							6.7								E
	======================================		•			$\triangle$		41.5					0								F
	=																				F
	45																				
	3																				E
	╡																				F
241.12	45																				E
241.12	<b>4</b> 3			rd; reddish brown; wet; f plasticity; slow dilatancy.		M	S14	45	11-20-25	45	18	16									
	4			,		Λ		46.5					50.3	15.2/ 15.7	24	10	3.1				F
	3													13.7							
	$\exists$																				
	$\exists$																				
	$\exists$																				E
	3																				F
236.12	50		CLAY with SAND (CL);	hard: gravish brown: we	t fine	-	S15	50	13-16-19	35	18	16									
	$\exists$		trace organic; low plasti	icity; slow dilatancy.	ι, πιο,	IX.	010		10 10 10			10	75.1		30	9	1.5				E
						Μ		51.5					75.1		30	"	1.5				F
	4																		$\sim$		E
2	3																				E
71201	$\exists$																				F
SLD	=																				E
Y	$\exists$																				E
231.12	55			edium plasticity; mediun		17	S16	55	8-13-23	36	18	18								PP: 1.0 tsf TV: 2.5 tsf	E
	<u> </u>		strength; medium tough oxidation.	nness; frequent reddish l	orown	X		56.5					78.3	31.7	41	17				1 V. Z.3 ISÍ	E
5	=					$\Box$		00.3													
ž	$\exists$																				
50.0																					E
	#																				F
	$\exists$																				E
-226.12	-60																				
231.12 231.12			(continue	d)																	
5									REPORT			חםו								DLE ID 0010R	
									BORINO DIST.		JNTY		RO	UTE	F	POSTN	ЛILE		E/		
	<b>A</b> C	۱۸۰	<b>IFORNIA</b>	URS HMM	ARUP			-	PROJECT	OP 5	אסוטי	2E N	ΔM⊏								
								Californ	nia H	igh-	Spe	ed T									
50.0	Н	ign-	Speed Rail Author	CALIFORNIA	HIGH-SPEED T	RAIN		E	BRIDGE N	NUMBI	ER		REPAF . Ma			ırran		DA1	ΓΕ 20-12	SHEET 3 of 9	
								_						ייניט י					- 1/	, - 5. 5	_

SPIRALINE CONTRACTORICREER   INSTRUCTORIC   Standard   Standard	California Hig LOGGED BY N. Goodenow	h-Speed Train Fresno to Bakersfield  BEGIN DATE COMPLETION DATE  Oct-17-11 Oct-19-11	BORE			ATION (L. 4 / E63:								H			
MAMMERT PYPES AND SIZE(S) (ID)   SPT HAMMERT D   Automatic, (40) Ibs, 30 onto drop   SPT 1-3,987   SPT 1-3,987	Gregg/D. Selde	ers	IN-SIT Star	U TE: ndpip . RIG	STING e Pie									S	URFAC 286.1: OREHO	CE ELE 2 ft (N OLE DI	IAVD88)
SOURHOUTH FACORILL AND COMPLETION		<u> </u>				PE/HAMI	MER ID	)									CIENCY, ERI
Piezometer   READINSS   Not Recorded   165 ft	SPT(1-3/8")	SHILL AND COMPLETION							•	\CTCC	ווסח פ	LINC	/DATE	- 1		DEDTU	LOE BODING
SANDY CLAY (CL.): very stiff; dive brown; wet, fine;   VST   60   0.11.14   25   18   10   0.15	Piezometer	ILL AND COMPLETION			AILK				, ,								TOT BOKING
tow plasticity: rapid clietancy.  65 reddish brown: medium: subrounded; stratified to laminated medium plasticity; medium dry strength; slow dialatory, low toughness.  70.0°, grades hard.  70.0°, grades hard.  71.12 75	Elevation (ft)  B Depth (ft)  Material Graphics									200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	
SILTY SAND (SM); dense; light brown; wet, fine to medium; interbedded with SILT; hard, brownish gray, wet, low plasticity; low dry strength; low toughness.  (continued)  REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE EA	3		îne;	S			25	18	16	64.5	23	25	8	1.9		000000000000000000000000000000000000000	
SILTY SAND (SM); dense; light brown; wet, fine to medium; interbedded with SILT; hard, brownish gray, wet, low plasticity; low dry strength; low toughness.  (continued)  REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE EA	221.12 65	laminated; medium plasticity; medium dry strengt		S			23	18	17	63.5	21.7	43	26	5.8		000000000000000000000000000000000000000	
(continued)    REPORT TITLE   HOLE ID   S00.10R     DIST.   COUNTY   ROUTE   POSTMILE   EA	216.12 70	70.0', grades hard.		S			3 35	18	15	_							
(continued)    REPORT TITLE   HOLE ID   S00.10R     DIST.   COUNTY   ROUTE   POSTMILE   EA	<u> </u>	medium; interbedded with SILT; hard, brownish g	gray,	S			48	18	15							000000000000000000000000000000000000000	
BORING RECORD S0010R  DIST. COUNTY ROUTE POSTMILE EA	206.12—80	(continued)				DEDODT	TITLE										I E ID
California High-Speed Train	CAI		ARUP		1	BORIN DIST.	G RE	JNTY	,	RO	UTE	F	POSTI	MILE		S	0010R
High-Speed Rail Authority    CALIFORNIA HIGH-SPIED TRAN   BRIDGE NUMBER   PREPARED BY   DATE   SHEET	LII LII	Speed Pail Authority	CHA SCHILL	BAN		Califor	nia H	igh-	Spe	ed T					1		0=-

	ECT NA		h-Speed Train Fresno to Bakersfield															T NUN	1BER	
LOGG	ED BY		BEGIN DATE COMPLETION DATE					TION (La								Н	OLE ID	)		
	NG CC		Oct-17-11 Oct-19-11 ACTOR/DRILLER	N21 IN-SIT				1 / E632	8341	1.73	/ (N	Natio	nal G	ria)			SOO1		VATION	
	gg/D.							zometei	r; PS	Log	gging	g							IAVD88)	
	ING ME			DRILL		-													AMETER	
			ROTARY(5'-165') ) AND SIZE(S) (ID)	Mob SPT H				PE/HAMN	1FR IF	)							3.75 i		CIENCY, ERI	_
SPT	(1-3/8	")						0 lbs, 30			ор						38%		0.2.10., 2.1.	
	HOLE E		FILL AND COMPLETION	GROU READI			ΓER	DURING			3 <i>A</i>				(DATE	.			OF BORING	
Piez	omete	:1		112121				Not Re	corde			IN	ot Rec	oraea		1	65 ft			Т
		ics			'n	Ŀ	(#)						Moisture Content (%)		(%)		Shear Strength (tsf)			
(#)		iraph			ocatic	qwn	epth	6 in.	ol/ft)	lë)	(ii)	(%)	Sonte	nit (%	ludex	(%)	ength	ethod		
Elevation (ft)	Depth (ft)	rial G			ole Lo	ole N	ole D	s per	lue (t	tratio	very	Vash	nre (	d Lin	icity	nics	r Stre	og Me		
Elev	Dept	Material Graphics	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moist	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shea	Drilling Method Casing Depth	Remarks/ Other Tests	
	80 =		SANDY SILT (ML); hard; light gray brownish gray; fine; subrounded; low plasticity; rapid dilatancy; more			S21		19-23-30	53	18										ŧ
	∃		reddish oxidation staining.	Julea	X		81.5					58	28.4	25	2	1.8				
	Ξ				H															E
																				E
	=																			E
	∃																			
	Ξ																			E
201.12	85		SILT with SAND (ML); very dense; brownish gray;		$\forall$	S22	85	8-24-34	58	18	17	-								E
	₫		fine; low plasticity.	,	IXI							74.5	31.3	27	1	1.6				E
	Ξ				Н		86.5													E
	=																			E
	₫																			E
	Ξ																			E
	∃																			
196.12	85					S23	90	40.40.07	43	10	15	-								
	∃		SANDY SILT (ML); dense; brownish gray; wet; fine	€.	M	523	90	10-16-27	43	18	15	66.5								E
					Н		91.5					66.5								F
	-																	>		
																				E
	∃																			E
	=																			E
101 12	. =																			
191.12	95		SILTY SAND (SM); dense; brownish gray; wet; fin little SILT; trace GRAVEL.	e;	M	S24	95	13-18-21	39	18	16									
	=		95.8' - 95.9', gravel seam.		$\mathbb{N}$		96.5													E
	∄																			Ė
																				E
	$\exists$																			E
191.12	_=																			E
	=																			
<b>-</b> 186.12	100	11.11	(continued)					I		1								للكا		
			, ,					REPORT			_								LE ID_	_
								BORINO DIST.	_	ECC JNTY			UTE		POSTN	ИILF		S(	0010R	
		۸.	LIEODNIIA URS HMM A	RUP																_
				-				PROJECT Californ	ia H	igh-	Spe	ed T								
	Н	ıgn-	Speed Rail Authority	-SPEED TH	RAIN		E	BRIDGE N	IUMBI	ER			RED B I <b>ggi/T</b>		ırran		DA <sup>2</sup>	ГЕ 20-12	SHEET 5 of 9	
							_													_

	JECT NA		h-Speed Train Fres	no to Bakersfield															T NUI		
LOGO	GED BY Goode		BEGIN DATE Oct-17-11	COMPLETION DATE Oct-19-11					TION (La								Н	OLE IE			
DRILI	LING CO	NTRA	ACTOR/DRILLER		IN-SIT	U T	EST	ING						O	,		SI	JRFA	CE ELE	EVATION	
	egg/D. LING ME				Star		•	Piez	zometei	r; PS	Log	ging	)						,	NAVD88)	
AU	GER(0	'-5'),	ROTARY(5'-165')		Mob	oil E	3-80										3	3.75 i	n		
	PLER T\ T(1-3/8		) AND SIZE(S) (ID)						PE/HAMM D lbs, 30			р						AMME 38%	REFF	ICIENCY, ERI	
BORE		BACK	FILL AND COMPLETION		GROL READ			ΓER	DURING			; A		DRIL ot Rec		(DATE	<b>′</b>			H OF BORING	
Pie	Zomete	er			I CL ALD	II 10			Not Re	coraec	1		N		oraea		1	65 ft			
Elevation (ft)	Depth (ft)	Material Graphics		escription		Sample Location		Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
			Poorly graded SAND windense; gray; wet; mediu	h SILT (SP-SM); medium m; subrounded; trace SIL	і .Т.	$\bigvee$	S25	100	15-19-16	35	18	15							MM		
404.40	105							101.5					13.9	18.9					<u> </u>		
			plasticity; low dry streng toughness.					106.5		92	18	17	77.1						1000000000000000000000000000000000000		
	111111111111111111111111111111111111111		fine; subangular; little Si dilatancy.	se; brown to dark brown; LT; trace coarse SAND; s	wet; slow			111.5			18	18	31.9								
171.12	120		115.0', grades medium	JETISE, DIOWII.				116.5	11-15-20	35	18	18							000000000000000000000000000000000000000		
			(continued	1)																	
	H	CA igh-	LIFORNIA Speed Rail Author	URS   HMM   A	ARUP H-SPEED TO	RAN		D P	REPORT BORING DIST. PROJECT Californ BRIDGE N	COL COL OR B nia Hi	RIDG gh-	SE N/	AME ed T	UTE rain RED B		POSTN	ИILE	DA	S EA	OLE ID 0010R	
2		3		,				٦	(IDOL IV	-CIVIDE	-1 \			ggi/T		rran		2-2	20-12	2 6 of 9	

ROJECT NAME <mark>California High-Speed Train Fresno to Bakersfield</mark>													_   1	ROJECT 1 <b>3157</b>	7-00	
OGGED BY  BEGIN DATE  COMPLETION DATE  Oct-19-11  Oct-19-11	BORE N21	=HOI 1509	LE L 921.	OCA .784	TION (Lat	t/Long !8341	or N .737	orth/ 7 (N	East a Iatio	and Da nal G	rid)			OLE ID <b>3001</b>		
RILLING CONTRACTOR/DRILLER	IN-SI	TUT	EST	ING							,		SU	JRFAC	E ELE	EVATION
Gregg/D. Selders RILLING METHOD	Sta		•	Piez	zometer	r; PS	Log	ging	9							IAVD88)
AUGER(0'-5'), ROTARY(5'-165')	Mol	bil E	3-80										3	3.75 in	١	
AMPLER TYPE(S) AND SIZE(S) (ID)					PE/HAMM Ibs, 30			าก						AMMEF 38%	REFFI	ICIENCY, ERI
SPT(1-3/8") DREHOLE BACKFILL AND COMPLETION					DURING			-	FTER	RDRIL	LING	(DATE	- 1		EPTH	OF BORING
Piezometer	READ	DING	S		Not Re	corde	t		N	ot Rec	orded		1	65 ft		
Description  Description		Sample Location		Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
SAND with SILT (SP-SM); very dense; grayish b wet; fine; few fines; variegated with dark brown coloring; reddish brown oxidation staining.	orown;	X	S29	120 121.5	15-22-35	57	18	16							000000000000000000000000000000000000000	
1.12 125 SILT with SAND (ML); hard; brownish gray; wet; plasticity; medium dry strength; low toughness; varigated with brown partings.	low			125 126.5	38-68-50	118/	14	14	70	36.9	44	12			000000000000000000000000000000000000000	
6.12 130 SILTY SAND (SM); very dense; brownish gray; v fine.	wet;		S31	130 131.5	20-28-27	55	18	18	46.3							
Poorly graded SAND (SP); very dense; light gray brown; wet; fine; trace fines; rapid dilatancy.	yish		S32	135 136.5	25-34-47	81	18	18							000000000000000000000000000000000000000	
6.12-140————————————————————————————————————									I					1 10		
				E	EPORT BORING	G RE					1.	OOT*	AII C		S	DLE ID 0010R
CALIFORNIA D	A 174 17				IST.		JNTY			UTE		POSTN	/IILE		EA	
CALIFORNIA LUSSIMMI	ARUP				ROJECT Californ					rain						
High-Speed Rail Authority																

ROJECT NAME  California High-Speed Train Fresno to Bakersfiel	ld	-1.76:		0	101: "					=			_ 1	3157	T NUI 7 <b>7-00</b>	
OGGED BY BEGIN DATE COMPLETION DATE  N. Goodenow Oct-17-11 Oct-19-11	BORE N21	HOL 1509	E LO 21.7	CAT 84	ION (Lat / E632	t/Long !8341	or N .737	orth/l 7 (N	=ast a latio≀	nd Da nal G	tum) rid)			OLE 10	10R	
RILLING CONTRACTOR/DRILLER	IN-SIT	TU TE	STIN	IG									SI	JRFAC	CE ELE	EVATION
Gregg/D. Selders RILLING METHOD	Star			iez	ometer	r; PS	Log	ging	)							NAVD88)
AUGER(0'-5'), ROTARY(5'-165')	Mob													3.75 i		IIAIVIE I EK
AMPLER TYPE(S) AND SIZE(S) (ID)	I				E/HAMM								H	AMME		FICIENCY, ERI
SPT(1-3/8") OREHOLE BACKFILL AND COMPLETION					lbs, 30			•	CTCC	וחחח	LINC	(DATE		38%	DEDTI	H OF BORING
Piezometer	READ			.1\	Not Re			, ,		ot Rec		(DATE	- 1	65 ft		TOI BORING
										(%)		(i		îf)		
Description (#)  Material Graphics  Description				Sample Deptn (π)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
CLAYEY SAND (SC); very dense; brownish grine; little CLAY; no dilatancy; variegated dark brown parting oxidations.  Poorly graded SAND (SP); dense; light olive b wet; medium; subrounded.	yellowish	X	14	1.5	15-15-17	98/ 9"	18								<u> </u>	
SILTY SAND (SM); very dense; light brown; w some SILT; slow dilatancy.	et; fine;	<u> </u>		50 1	17-32-36	68	18	18	30.8	36.8					<u> </u>	Created a rat ho down to 165.0'
(continued)					EPORT TO ORING		CO	PRD							НС	DLE ID 0010R
					ST.		JNTY		RO	UTE	F	POSTN	/ILE		EA	
CALIFORNIA High-Speed Rail Authority	MARLIP				ROJECT					roin						
High-Speed Rail Authority	A HGH-SPEED TO	RAN			aliforn RIDGE N					rain RED B	Y			DA	TF	SHEET
				טר	VIDGE IV	OIVIDE	-11	D	. Ma	ggi/1	. Cι	ırran		2-2	20-12	2 8 of 9

	ECT NA		n-Snood Train Fro	sno to Bakersfield	l														77-00		
LOGG	SED BY	_	BEGIN DATE	COMPLETION DATE	BORE				TION (Lat								Н	OLE IE	)	<u> </u>	
	Soode ING CO		Oct-17-11	Oct-19-11	IN-SIT				I / E632	8341	./3/	(IN	ation	aı G	ria)				10R	EVATION	
	gg/D.								zometer	; PS	Log	ging	I							NAVD88)	
	ING ME				DRILL Mob															IAMETER	
			ROTARY(5'-165')  AND SIZE(S) (ID)						PE/HAMM	FR ID							_	3.75 i		ICIENCY, ERI	
	T(1-3/8		7 4 13 0122(0) (13)						) lbs, 30			р						38%		IOILITOT, LIT	
			ILL AND COMPLETION		GROU READI			ER	DURING			Α	FTER			DATE	′ I			H OF BORING	
Piez	zomete	er			INLADI				Not Red	cordec			No	t Rec	oraea		1	65 ft			
		S				Ē	۰	(H)						Moisture Content (%)		(%)		(tsf)			
£		aphi				catio	mpe	pth (	e in.	I/ft)	(in)	Œ.	(%)	onte	t (%)	хәрс	(%	ngth	thod		
tion	(ft)	al G				le Lo	e Z	le De	per	q) ər	ratio	ery (	/ash	o al	Li Ei	city II	ics (	Stre	g Me		
Elevation (ft)	Depth (ft)	Material Graphics	г	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	loist	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
H	160		<u> </u>	Description		S	o)	o)	ш		<u>п</u>	ľ	7	2		п	0	o o		Other rests	+
																			000		
	=																		<u> </u>		E
	=																				H
	=																				
																			000000000000000000000000000000000000000		
121.12	165 <del></del>																				
	=		Borehole terminated at 10/19/2011. Overdrille	a depth of 165.0' on d hole to 165.0' for PS Lo	ogging.																Ħ
	170		For corrosion test resul	lts, see Appendix E.																	
	╛		Soil moisture indicated	as "wet" because SPT sa	amples																Ħ
			drilling fluid. Soil moist	rieval through rotary meth ture indication should not	be																
			used as an indication of free groundwater table.	of a potential phreatic surf	ace or																
	╛		•	end for soil classification	chart																
			and key to test data an		oriart																
116.12	170																				
	I⊒																				Ħ
	=																				
0/12	╛																				
3 2/20																					Ħ
.GLB																					
24 111.12	175																				
S	=																				
DOT																					
RUP																					Ħ
, Ldg	=																				Ħ
F-B.C																					E
4 <u>8</u> 2	_=																				Ħ
Ö P																					E
1.0.3 BOREHOLE LOG - CHSTP F-B. CHSR_F-B.GPJ. ARUP DOTR LIBRARY.GLB 220/12 71.0.3 BOREHOLE LOG - CHSTP F-B. CHSR_F-B.GPJ. ARUP DOTR LIBRARY.GLB 220/12 71.0.3 BOREHOLE LOG - CHSTP F-B. CHS	180																				
<sup>-</sup>								F	REPORT T	ITLE									НС	DLE ID	
90]								E	BORING	3 RE			B0:	IT-		007*	AII =		S	0010R	
OLE		- A I	IEODY II 4	D					DIST.		NTY		ROL	) E		OSTN	/IILE		EA	<b>\</b>	
			<b>IFORNIA</b>	URS HMM	ARUP				ROJECT					rain							
).3 BC	H	ligh-S	peed Rail Author	rity CALFORNA H	HOH - SPEED TE	RAN			BRIDGE N			PF	REPAR	ED B				DA	TE	SHEET	
<del>.</del>												<u>  D</u>	. Mag	ggi/T	. Cu	rran		2-2	20-12	2   9 of 9	

Califo	T NAME <b>rnia Hi</b>	gh-Speed Train Fre	esno to Bakersf	ield											- 1	ROJEC <sup>*</sup>		
OGGED.	BY odenow	BEGIN DATE	COMPLETION DA	ATE BOR			TION (La 6 / E633									OLE ID <b>3001</b>		
ORILLING	G CONTE	RACTOR/DRILLER		IN-SI	TU TES	TING				- (-			,		SI	JRFAC	E ELE	VATION
	/D. Seld				Loggi	ng												NAVD88)
	G METHO (R(0'-5')	)) , ROTARY(5'-165')			L RIG bil B-8	0										окенс 6.25 ir		AMETER
		S) AND SIZE(S) (ID)		SPT	HAMME	RTY	PE/HAMN								_			ICIENCY, ERI
SPT(1						-	0 lbs, 30			•					- 1	38%		
	ement	KFILL AND COMPLETION arout	ı		UNDWA DINGS	NER	DURING Not Re			3 A		DRILI		,	′ I	165 ft	EPIH	OF BORING
Elevation (ft)	Depth (tt) Material Graphics		Description		Sample Location Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
	0 =	ASPHALT (7") (AC).			S0	1 0			60	60							11	
	= 000	AGGREGATE BASE ( SILTY SAND (SM); me	, , ,	brouge:	200												{}	
	3	moist; medium; subrou			200												$ \cdot $	
		dilatancy; [FILL].			202													
					303						18.2						{{   }	
	311				200												<u>{</u> [	
					0.0												{(	
82.57	5	Poorly graded SILTY S	PAND (SM): modium	donoo: light	( S0:	5 2 5	6-11-11	22	18	18							<u>K</u>	
		reddish brown; moist; i	mostly medium; subre	ounded; few	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		0-11-11	22	10	10							000	
		SILT; rapid dilatancy; t	becomes brown [ALL	OVIONIJ.	Δ	6.5					20.2	6.1					000	
					∭ S0:	6.5	5-5-11	16	18	14							000	
	311				Δ	8					18.3	12					000	
					\ S0-	4 8	10-15-22	37	18	16							000	
	3111	CII T with CAND (MI)	hard brounish arou		-  \]	9.5											000	
		SILT with SAND (ML); slow dilatancy; weak co			S0:		25-33-26	59	18	17							000000000000000000000000000000000000000	
77.57 10	0=				X	11					73.7	24.4					000	
	-311	Sandy SILT (ML); very			-/ \ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		9-12-14	26	18	18							000	
		brown; fine; some SAN calcite seams.	nd, weak cementation	n, iew	M.	] ''	0 12 14	20		10							000	
					_/\	12.5					65.7	27.3					000	
		SILTY SAND (SM); me subangular; some SILT	edium dense; brown; T; rapid dilatancy.	medium;	N So	7 12.5	5-6-8	14	18	15							000	
					Δ	14					21.4	15.5					000	
					S0	3 14	18-21-33	54	18	17							000	
72.57 1	5				M	15.5					37	26.1					000	
	311																000000000000000000000000000000000000000	
																	000	
																	000	
																	000	
		Sandy SILT (ML); very															000	
	4	reddish brown; wet; low low toughness.	w plasticity; medium o	dry strength;													000	
67.67	<u>                                   </u>																000	
67.57 <b>—</b> 20	U	(continue	ed)															
							REPORT BORING		.CO	BD								DLE ID 0012R
							DIST.		INTY		RO	UTE	F	POSTN	/ILE		EA	
	· C ^	LIFORNIA	URS	HMM ARUP			PROJECT	OR P	BIDO	E NI	AME							
	LI:-L	LIFORNIA -Speed Rail Autho	1			_ (	Californ	nia Hi	gh-	Spe	ed T							
	nigh	-speed Kall Autho	TIIY CALIF	UHNA HIGH-SPEED	TRAN	E	BRIDGE N	NUMBE	ER			RED B' ggi/T		ırrən		DAT 2-2	E 20-12	SHEET 1 of 9

PROJECT NAME <b>California High-Speed Train Fresn</b>	o to Bakersfield													1	1315	77-00	MBER )
OGGED BY BEGIN DATE C	COMPLETION DATE Oct-25-11	BORE N21	HOL 482	E LC 215.4	OCA 466	TION (La / E633	t/Long 80773	or N 3.973	orth/ 3 (N	East a <b>Vatio</b> i	and Da nal G	tum) rid)			OLE 11	ը <b>12R</b>	
DRILLING CONTRACTOR/DRILLER		IN-SIT	U TI	ESTII	NG				`					SI	JRFA	CE EL	EVATION
Gregg/D. Selders  DRILLING METHOD		PS			J									_			NAVD88) DIAMETER
AUGER(0'-5'), ROTARY(5'-165')		Mot													3.25		AMINIC I EK
SAMPLER TYPE(S) AND SIZE(S) (ID)		1				PE/HAMM Ibs, 30			n					- 1	AMME 38%	R EF	FICIENCY, ERI
SPT(1-3/8") BOREHOLE BACKFILL AND COMPLETION						DURING			•	FTEF	RDRIL	LING	(DATE	- 1		DEPT	H OF BORING
Neat cement grout		READ				Not Re					ot Rec		`		65 f	t	
Elevation (ft) Depth (ft) Material Graphics	cription		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
SILT (ML); very stiff; brown	nish gray.			_	20	10-14-16		18	17							<del>/~</del>	
SILTY SAND (SM); dense; some SILT; slow dilatancy.	brown; wet; mostly find	e;	\[ \]	2	21.5					68.4	33.2						
62.57 25 SILTY SAND (SM); mediungray mottled with brown; we slow dilatancy; dark brown along 1-inch thick seam in	et; mostly fine; little SIL hydrocarbon contamin	LT;			25 26.5	9-8-18	26	18	18							2000000000000000000000000000000000000	Hydro-carbon contamination. Strong smell an easily visible.
30' grades to dense; gray t	o grayish brown; rapid				30	8-11-24	35	18	18	-						1/ -	Hydro-carbon contamination.
52.57 35 Poorly-graded SAND with dense; light brownish gray; dilatancy.		 1	X		35 36.5	8-9-11	20	18	15	6.8	-						
47.57 40																10000000000000000000000000000000000000	
(continued)					1 -	FD0==	T.T									1	01 E 15
					В	EPORT SORING IST.	G RE	CO INTY			UTE	F	POSTN	ИILE			OLE ID 60012R A
CALIFORNIA	URS HMM A	ARUP			P	ROJECT	ORP	RIDO	SE N	AME							
High-Speed Rail Authority	1		-		C	Californ	ia H	igh-	Spe	ed T					1 -		Te:
Tilgii-Speed Kuli Aulilorii)	C Deruma Più	- ST WHAT T			B	RIDGE N	NUMBE	=K			RED B I <b>ggi/</b> ]		ırran			TE 20-1	SHEET 2 2 of 9

۲.	•
÷	
Ċ	•
'n	•
S T	5
Ť	•
250	•
•	•
~	,
_	•
•	
М.	)
5	
2	5
_	í
7	,
ī	i
	5
_	5
4	
_	:
•	!
è	•
2/20	ı
õ	5
Ç	ĺ
5C/9U	5
Ć	•

LOGGED BY	gh-Speed Train Fresno to Bakersfield BEGIN DATE COMPLETION DATE	BOREHOLE									<b>1</b> :	OJECT 31577 DLE ID	<b>'-00</b>	ER 	_
Gregg/D. Seld	RACTOR/DRILLER ders	N21482 IN-SITU TE PS Logg	STING		υ <i>//</i> 3	.9/3 (I	vatior	nal Gr	10)		SU 28		ELEV	VD88)	_
DRILLING METHO (0'-5') AUGER	DD , ROTARY(5'-165')	DRILL RIG Mobil B-	-80									REHOI .25 in	_E DIA	METER	
	S) AND SIZE(S) (ID)	SPT HAMN				dran					HA	MMER	EFFIC	ENCY, ERI	_
SPT(1-3/8") BOREHOLE BACK	KFILL AND COMPLETION	Automat		-		•	AFTER	DRILL	LING ([	DATE		8% TAL DE	EPTH C	F BORING	_
Neat cement	grout	READINGS	-	Not Re	corded		N	ot Reco	orded		16	65 ft			_
Elevation (ft) Depth (ft) Material Graphics	Description	Sample Location	Sample Number Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in) Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Casing Depth	Remarks/ Other Tests	
40 =	SILTY SAND (SM); medium dense; light browni wet; medium; some fines; rapid dilatancy.		13 40		27	18 17		_				_			_
242.57 45		Δ	41.5				26.3								
45	Poorly-graded SAND with SILT (SP-SM); mediu dense; light brownish gray; wet; medium; little S rapid dilatancy.		14 45	9-11-12	23	18 17	14	14.8					000		
37.57 50			46.5												
7.57	SILTY SAND (SM); medium dense; reddish bro fine to medium; subrounded; little SILT; trace G		515 50	17-22-28	50	18 18							000		
2.57 55	slow dilatancy.		51.5				48.5	18.5				×			
	Poorly-graded SAND with SILT (SP-SM); dense reddish brown; wet; mostly medium grained sar fines; rapid dilatancy; mostly quartz, muscovite mafic material.	, id; trace	56.5		42	18   17	8.1								
227.57-60	(continued)														
<i>◯</i> CA	LIFORNIA LIRS HMM	ARUP	1	REPORT 1 BORINO DIST. PROJECT	COU OR BI	NTY RIDGE N	RO IAME	UTE	PC	OSTM	ILE		HOLE SOC EA	ID 112R	_
High	-Speed Rail Authority	HIGH-SPEED TRAN		Californ	ia Hi	gh-Spe	eed T		Y			DATE	<b>.</b>	SHEET	_
(continued)  REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTM PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY D. Maggi/T. Curran							ran		2-20	)-12	3 of 9				

	ECT N		h-Speed Train Fresno to Bakersfield															T NUN	1BER	
LOGG	ED BY	Ĭ	BEGIN DATE COMPLETION DATE	BORE	HO	LE L	OCA	TION (La	t/Long	or N	orth/l	East a	nd Da	tum)		Н	DLE IE	)		
	Boode ING CO	_	Oct-24-11 Oct-25-11 ACTOR/DRILLER	IN-SI				6 / E633	0//3	5.97	3 (1\	lation	nai G	ria)				12R	VATION	_
Gre	gg/D.	Selde	ers	PS	Lo	ggin										- 1			IAVD88)	
	ING ME		) ROTARY(5'-165')	DRILL			)										OREH 6.25 i		AMETER	
			) AND SIZE(S) (ID)	SPT I	IAN	1MEF	R TYF	PE/HAMM								H/	AMME		CIENCY, ERi	_
	(1-3/8		FILL AND COMPLETION					DURING			-	CTCC	DRILI	LING			38%	DEDTL	OF BORING	
	t cem			READ			ILK	Not Re			, ,		ot Rec		(DATE	′ I	65 ft		TOI BORING	
													(%)		(%)		st)			
l 🗊		aphics			ation	nber	oth (ft	.⊑ਂ	(F	(ii)	<u>-</u>	(%	ntent	(%)	) xəp	<u> </u>	gth (1	por #		
j) noi	(#)	al Gra			e Loc	e Nur	e Der	per 6	(pl/	ation	ery (ir	ash (	9 0	Limit	ity Inc	%) sɔ	Stren	Meth		
Elevation (ft)	Depth (ft)	Material Graphics	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	-60-	≥	Poorly-graded SAND with SILT (SP-SM); dense;		\ /	ഗ S17		15-17-17	34	18	16	7	2		Δ.	0	S		Other rests	╣
	Ξ		reddish brown; wet; mostly medium; trace fines; r dilatancy; mostly quartz, muscovite and a mafic	apid	X		61.5					6.4								
			mineral				01.0													E
																				Ħ
	=																			
222.57	65		Poorly graded SAND (SP); dense; reddish brown;	wet;	1/	S18	65	14-20-24	44	18	18							202		Ħ
	=		mostly medium; trace fines; rapid dilatancy; mostl quartz, muscovite and a mafic mineral	ıy	X		66.5											200		E
																				E
	=																			
																		202		
																		000000000000000000000000000000000000000		
217.57	70 =		Sandy SILT (ML); very dense; reddish brown redd brown; subrounded; some SAND; slow dilatancy;		1/	S19	70	16-27-30	57	18	18									
	=		cementation; few dark mafic partings.	weak	X		71.5					50.1	16.2							H
	_																	202		
~																		000		
2/20/1																				Ħ
3LB 2																				Ħ
ARY.0																				
212.57	75 <del></del>		SILTY SAND (SM); very dense; multicolored brow red light brown, gray and brown; wet; mostly fine;		X	S20	75	42-50	50/ 3"	9	9	28.8	24.6					000000000000000000000000000000000000000		
00			SILT; trace fine GRAVEL; black oxidation parting along fissures.				76.5					20.0	27.0							Ħ
JAN J	Ξ																			
P C C																				Ħ
Ä.																				Ħ
HSR	=																			
9 L 207 5-																				
-207.57 9	<b>-</b> 8U		(continued)																	
ပ် ဗ								REPORT '			BD								LE ID 0012R	
0								DIST.		INTY		RO	UTE	F	OSTM	1ILE		EA	JU 14Π	
1.0.3 BOREHOLE LOG - CHSTP F-B CHSR F-B.GPJ ARUP DOTR LIBRARY GLB 2/20/12	<b>(</b>		LIFORNIA JURS HMM	ARUP				ROJECT												
BOR W	H	ligh-	Speed Rail Authority	H-SPEED T	RAN			Californ BRIDGE N					rain RED B	Y			DA	TF	SHEET	
1.0.3								Y YIDGE IV	OIVIDE	_1 \	Ď	. Ma	ggi/T	. Cu	rran		2-2	20-12	4 of 9	

	CT NA		h-Speed Train Fre	esno to Bakersfield COMPLETION DATE	   BOBI		NEI	004	TION (La	t/I one	orl	lorth/	Foot o	nd Do	tum\		1		77-00	MBER	_
N. G	ooder	_	Oct-24-11 CTOR/DRILLER	Oct-25-11		148	215	.466	6 / E633								5	003	12R	EVATION	_
Greg	g/D. \$	Selde	ers		PS	Lo	ggin										2	287.5	7 ft (I	NAVD88)	
ORILLII AUG			) ROTARY(5'-165')		DRIL Mo			)										OREH 6.25 i		IAMETER	
			AND SIZE(S) (ID)		SPT	HAN	/MEF	R TYF	PE/HAMN								H	AMME		ICIENCY, ERI	_
SPT(			FILL AND COMPLETION	ı	1				DURING			-	CTEE	ווסח	LING	/DATE		38%	DEDTI	H OF BORING	_
Neat				•	READ			ILK	Not Re			<i>3</i>		ot Rec		(DATE		65 ft		TOI BORING	
														(%)		(9)		sf)			
Elevation (ft)	S Depth (ft)	Material Graphics		Description		Sample Location		Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	80		SILT with SAND (ML); brown; wet; some SAN	hard; multicolored browni	sh	$\bigvee$	S21	80	20-35-49	84	18	15	74	29.3							
02.57	85	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	fine; little SILT; slow di SILT with SAND (ML); SILT; low plasticity; low	ery dense; grayish brown; v ilatancy. hard; brownish gray; wet; w dry strength; low toughn on seams in multiple locati	mostly ess;		\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \	85 86.5	16-34-62	96	18	16	73.8						<u>0000000000000000000000000000000000000</u>	PP: 2.5 tsf TV: 1.5 tsf	
97.57	90		SILTY SAND (SM); de slow dilatancy.	ense; grayish brown; little S	 SILT;		S23	90 91.5	14-12-24	36	18	18	16.2	30.1							
92.57	95			rd; grayish brown; wet; so ow dry strength; low tough			S24	95 96.5	17-30-52	82	18	16	67.8						000000000000000000000000000000000000000		
87.57 <b>-</b> 1																					
			(continue	ed)																	_
						_		E	REPORT T BORING DIST.	Ģ RE				UTE	F	POSTN	MILE			DLE ID 0012R	_
<u></u>	<b>(</b>	Δ'	I I FORNIA	URS HMM	ARUP			P	ROJECT	ORF	RIDO	SE N	AMF								_
		-/~\ 	LIFORNIA Speed Rail Autho						Californ	ia H	igh-	Spe	ed T								_
	п	911-	opecu kuli Aulio	The same of the sa				B	RIDGE N	NUMBI	=R			RED B		ırran		DA	TE 20-12	SHEET 5 of 9	)

۲.	•
÷	
Ċ	•
'n	•
S T	5
Ť	•
250	•
•	•
~	,
_	•
•	
М.	)
5	
2	5
_	í
7	,
ī	i
	5
_	5
4	
_	:
•	!
è	•
2/20	ı
õ	5
Ç	ĺ
5C/9U	5
Ć	•

Cali	ECT NAM <b>fornia h</b>	ligh-Speed Train Fr	esno to Bakers	field												1	3157	77-00		
.OGG	ED BY Soodeno	BEGIN DATE	COMPLETION D Oct-25-11	DATE B				TION (La 3 / E633									OLE 10	12R		
		TRACTOR/DRILLER		IN	N-SITU	TEST	TING							,		SL	JRFA	CE ELE	EVATION	_
	gg/D. Se				PS Lo		ıg											•	NAVD88)	
	ING METH	HOD 5'), ROTARY(5'-165')		I .	RILL RI Mobil		)										)REH 6.25 i		AMETER	
		E(S) AND SIZE(S) (ID)						PE/HAMN	/IER ID	)						_			ICIENCY, ERI	-
	(1-3/8")							0 lbs, 3			-						88%			
	HOLE BAI t cemen	CKFILL AND COMPLETIO	N		ROUNI EADIN		TER	DURING Not Re			6 A		DRILI		(DATE	′ I	otal 1 65 ft		OF BORING	
IVCa	Comon	t grout						Notre	Joordo					oraca		1				-
Elevation (ft)	Depth (ft)		Description		Sample Location		Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
		SILTY SAND (SM); v some SILT; slow dilat dark brown parting.	ery dense; grayish br ancy; interbedded; va	rown; wet; ariegated	<u>)</u>	\\ \\	100	13-30-100	0 130/ 10"	16	14							<u> </u>		
82.57	105	SILT with SAND (ML)	 ); very stiff; grayish br	rown; wet;		S26	105	14-14-13	27	18	18									
		some SAND; slow dil	atancy; slow dilatancy	y.	IX		106.5					79.4	29.9							
77.57	110	110' grades to hard; wet; mostly medium.	grayish brown to redd	lish brown;	;	S27	110	24-25-56	81	18	18	73.3								
72.57	115	SILTY SAND (SM); n medium; subangular; SAND; trace GRAVE cementation.	little fine SAND; little	coarse	itly	S28	115 116.5		26	18	18	29.8						000000000000000000000000000000000000000		
		1.1.																		
67.57	120																			_
		(continu	ıed)				-											,		_
							E	REPORT BORIN DIST.	G RE			RO	UTE	F	POSTM	IILE			DUE ID 0012R	_
	C	ALIFORNIA h-Speed Rail Auth	URS	HMM ARL	P			PROJECT Californ	nia H	igh-	Spe	ed T								_
	nig	n-speed Kall Auth	Orliy	FURNA HIGH-SE	TRAIN		E	BRIDGE N	NUMBI	ER	PF	REPAF . Ma	RED B' ggi/T	Υ . Cι	ırran		DA 2-2	TE 20-12	SHEET 6 of 9	

PROJECT NAME  California High-	Speed Train Fresno to Bakersfield		-1.10.	<u></u>	201	TION "	1/1 -					4 \		1	3157	77-00	MBER )	_
LOGGED BY N. Goodenow	BEGIN DATE COMPLETION DATE Oct-24-11 Oct-25-11					TION (La 5 / E633									OLE 10			
ORILLING CONTRACT Gregg/D. Selders		IN-SIT												- 1			EVATION	
ORILLING METHOD	•	PS DRILL			}									_			NAVD88)	_
AUGER(0'-5'), R		Mol	oil B	-80										6	3.25 i	n		
SAMPLER TYPE(S) A SPT(1-3/8")	ND SIZE(S) (ID)					PE/HAMM ) lbs, 30			าก					- 1	AMME 38%	R EFF	ICIENCY, ERI	
	L AND COMPLETION					DURING			•	FTER	RDRIL	LING	(DATE	- 1		DEPTI	H OF BORING	_
Neat cement grou	ut	READ	ING	S		Not Re	corde	i		N	ot Rec	orded		_   1	65 ft			_
Elevation (ft)  Depth (ft)  Material Graphics	Description Description			Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	S
	SILTY SAND (SM); very dense; wet; fine to coar SAND; rapid dilatancy; moderate cementation in ast 3 inches.				120 121.5	16-16-34	50	18	18							<u> </u>		
	25' grades to fine; slow dilatancy; (2-inch thick containing very dense; reddish brown silty sand 26.0' to 126.2').	layer from			125 126.5	19-29-49	78	18	18	30.7	43.5					000000000000000000000000000000000000000		
	29' grades to dense; light brownish gray; rapid lilatancy; light gray seam 1/4-inch thick.																	
	Poorly graded SAND (SP); dense; light brownish vet; medium; subrounded; few fines; rapid dilata		\ \		130	18-17-20	37	18	15							$\sim$		
152.57   135 -	Sandy SILT (ML); very dense; brownish gray; we terbedded with grayish brown, hard, wet; non-inedium toughness.  35.8', olive brown; wet; medium to fine; subrouew coarse SAND; rapid dilatancy.	plastic;			135 136.5	19-27-23	50	18	17	56.9	27.2					000000000000000000000000000000000000000		
47.57-140	SILT (ML); hard; light brownish gray; wet; little Coome fine SAND; medium plasticity; medium dry  (continued)	ELAY; /														000000000000	PP: 1.5 tsf TV: 1.0 tsf	_
						EPORT T			רטי								DLE ID	_
						BORINO DIST.	COL			RO	UTE	F	POST	ИILE		EA	0012R	_
ر ۱۱۱	FORNIA URS HMM	ARUP				ROJECT												_
CALI	FORNIA Deed Rail Authority					Californ					rain							
High-Sp	peed Kail Authority	IGH - SPEED T	RAN			RIDGE N			PF	REPAR	RED B				DA	TE 20-12	SHEET 7 of 9	

PROJECT NAME  California High-Speed Train Fresno to Bakersfield  LOGGED BY BEGIN DATE COMPLETION DATE BOREHOL								·								- 1		T NUN <b>77-00</b>		
LOGG	ED BY		BEGIN DATE COMPLETION DATE Oct-24-11 Oct-25-11					TION (La								Н	OLE II	)		
DRILL	ING CC	NTR	ACTOR/DRILLER	IN-SIT				, , ⊏033	0113	J. 37 3	۱۱) د	naliUl	ıaı G	iiu)		SI	JRFA		EVATION	_
	gg/D.			PS I			g											•	NAVD88)	_
	ING ME SER(0		D ROTARY(5'-165')	DRILL Mob			)									- 1	OREH 6.25 i		IAMETER	
AMP	LER TY	PE(S	s) AND SIZE(S) (ID)					PE/HAMM								H	AMME		ICIENCY, ERI	_
	(1-3/8 HOLE E		FILL AND COMPLETION	1				DURING			•	FTEF	R DRIL	LING	(DATE	- 1	38% OTAL	DEPTH	OF BORING	
	t ceme			READ				Not Re					ot Rec		, <b>.</b>		65 ft			_
		တ္ပ			_		<b>f</b>						t (%)		(%)		(tsf)			
æ.		aphic			cation	mber	pth (1	ë. E	Œ	(ii)	in)	(%)	onter	t (%)	yapı	(%	ngth (	thod		
Elevation (ft)	) (ft)	ial Gr			le Lo	le Nu	le De	ber (	q) ən	ration	very (	Vash	ure C	Limi	city Ir	) soir	Stre	g Me		
Eleva	Depth (ft)	Material Graphics	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
$\neg$	140	$\bar{\parallel}$	strength; medium toughness; mottled with dark rebrown oxidation staining.	eddish	Ŵ	S33			64	18	17	.,	<u> </u>		_	Ť	<u> </u>			_
	$\exists$		brown uniquiton stallling.		V		141.5					86.5	32.8	40	10	1				
	$\exists$																			
	╡																			
	∃																			
2 57	145		SILTY SAND (SM); dense; olive brown; wet; fine	; some																
			SILT; slow dilatancy; mottled with reddish brown oxidation partings.		M	S34	145	17-22-25	47	18	16									
					$\Lambda$	ļ	146.5													
	=																			
	$\exists$																			
	=																			
7.57	150		Sandy SILT (ML); hard; grayish brown; wet; som		1	S35	150	9-10-15	25	18	17									
	₫		SAND; slow dilatancy.	-	X							61.8	36					000000000000000000000000000000000000000		
	$\exists$				/ \	ļ	151.5													
	-																			
	=																			
	₫																			
	3																	<u> </u>		
2.57	155																			
	∃																			
	=																			
	=																			
27.57	160																	200		
ı .טı	100		(continued)																	
								REPORT T		: : :	RD								OLE ID 0012R	
								DIST.		JNTY		RO	UTE	F	POSTN	<b>MILE</b>		EA		
	<b>(</b>	A	LIFORNIA JURSIHMMI	ARUP			P	ROJECT	OR B	RIDO	SE N	AME	-roin							_
			C In the drawn in	GH-SPEED TO	RAN			Californ BRIDGE N			PF	REPAI	RED B	Y			DA	TE	SHEET	_
	Tight opeca itali Admortly										<u> </u> D	. Ma	ıggi/∖	ı. Cu	ırran		2-	20-12	2 8 of 9	

ř	
Ļ	
÷	
~	
HST.	
Ï	
n	
F F	
œ	
•	
ო	
5	
5	
Ճ	
Ź	
ADDEN	
٥	
٥	
⋖	
2	
5	
ิ	
6/29/2012 /	
Ñ	
છે	
5	

	ECT No		h-Speed Train Fresno	n to Bakersfield															T NUI <b>77-00</b>		
LOGG	SED BY		BEGIN DATE C	OMPLETION DATE	BORE	HOI	LE LO	OCA 466	TION (La	t/Long	or N	orth/l	East a	nd Da	tum)		Н	OLE IE	)		
	Goode		Oct-24-11 ACTOR/DRILLER	Oct-25-11	IN-SIT				6 / E633	0173	0.973	) (1)	latior	iai G	na)		_		12R CE ELE	EVATION	—
Gre	gg/D.	Selde	ers		PS	Log	gin										2	287.5	7 ft (1	NAVD88)	
	ING MI GER(C		D ROTARY(5'-165')		DRILL			)									- 1	OREH 3.25 i		IAMETER	
			) AND SIZE(S) (ID)		SPT F	IAM	MER	RTYF	PE/HAMN								H	AMME		ICIENCY, ERI	
	Γ(1-3/8								) lbs, 30			•				·	- 1	38%	DEDT!		
	HOLE It cem		FILL AND COMPLETION rout		READ			ER	DURING Not Re			; <i>P</i>			crded	(DATE		65 ft		OF BORING	
														(%)							$\Box$
		hics				tion	per	h (ft)	نے		n)			Moisture Content (%)	(%	Plasticity Index (%)		Shear Strength (tsf)	ے او		
Elevation (ft)	æ	Material Graphics				Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Con	Liquid Limit (%)	/ Inde	Organics (%)	treng	Drilling Method Casing Depth		
vatio	Depth (ft)	terial				nple	nple	nple	ws be	/alue	netral	cover	) Was	sture	ja ja	sticity	anica	sar S	ling N	Remarks/	
Ele	160 <b>—</b>	Ma	Desc	cription		Sar	Sar	Sar	Blo	ź	Per	Rec	200	Mo	Lig	Pla	O D	She		Other Tests	3
																			000000000000000000000000000000000000000		E
	_																				
	=																				F
																					E
	=																				-
122.57	165-																				
			Borehole terminated at a di 10/25/2011. Overdrilled ho		aaina																Ė
	Ξ		For corrosion test results, s		iggirig.																F
117.57	=		Soil moisture indicated as '	• •	amnlee																
	=		became wet during retrieva drilling fluid. Soil moisture	al through rotary meth	od																E
			used as an indication of a process of the groundwater table.																		Ē
	=		See Borehole Log Legend	for soil classification (	chart																=
117 57	170		and key to test data and sa		Jiait																
117.57																					
																					-
1																					
	=																				
	=																				E
	   =																				
112.57	175																				Ē
	=																				F
																					F
																					Ē
	<u> </u>																				Ė
																					E
<b>-</b> 107.57	<b>-</b> 180 <b></b>	<u> </u>																			
									REPORT											DLE ID	
107.57									BORINO DIST.		CO JNTY		RO	UTE	F	POSTN	ЛILE		S	0012R	
	> (	^ ^	LIFORNIA	URS HMM	ARUP				ROJECT												
			LIFURINIA  Speed Rail Authority	1					Californ	iia Hi	igh-	Spe	ed T								
		iign-	speed Kall Authority	GALFORNA H	IGH-SPEED T	MAN	_	В	RIDGE N	IUMBE	R		REPAR . Ma			ırran		DA 2-2	TE 20-12	SHEET 9 of 9	9_

			n-Speed Train Fresno to Ba	kersfield	2005:10		001	TION! "	1/1 -		In. (1	F		4 · `		_   1	315	77-00	MBER )
Logge A. Po			BEGIN DATE COMPLET Oct-19-11 Oct-20-					TION (La 3 / E633									900,		R
	NG COI		CTOR/DRILLER	1	N-SITU 1	EST	ING				,			•		SI	JRFA	CE EL	EVATION
	NG ME				Standp DRILL RI	•	piez	zometer											NAVD88) DIAMETER
			, ROTARY(6.5'-151.5')		Failing			DE#145.55	4ED ::-								1.875	in	
	.ER TYI (1-3/8'		AND SIZE(S) (ID)					PE/HAMN D lbs, 30			эр					- 1	AMME 38%	K EFF	FICIENCY, ERI
BOREH	OLE B	ACKF	ILL AND COMPLETION		GROUNE		ΓER	DURING			3 A		RDRIL		(DATE	E) T(	OTAL		H OF BORING
Plezo	omete	r			NEADING.			Not Re	corde	1		N	ot Rec	orded		1	51.5	ft	
Elevation (ft)	Depth (ft)	Material Graphics	Description		Sample Location		Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method	
			Poorly graded SAND (SP); brown; n SILT; fine medium SAND; trace coacementation.			S01	0			60	60							\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	1" concrete pavement; garbage barrel
			4.0', ceramic and glass debris in cut	itings.	0000000		5					48.3							Modified Proctor Max $\gamma_d$ = 125.5 pcf Optimum W <sub>i</sub> = 9.8%
281.05	5		Poorly graded SAND (SP); very den moist to dry; trace SILT; fine mediur coarse SAND; weak cementation. Poorly graded SAND with SILT (SP-	m SAND; trace	e; - 🕌	S02	5 6.5	26-26-50	76/ 11"	17	16								
			grayish brown with reddish brown m SILT; fine SAND; trace coarse SANI cementation.  Poorly graded SAND (SP); dense; re	D; weak	; X	S03	8	26-19-12	31	18	14	30.8	10.1						6.5' mud tub set; 6" drag bit
	10—		trace SILT; fine medium SAND; wea	ak cementation.	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	S04	8 9.5	37-50	50/ 3"	9	9	28.3	12					MMM	
276.05	10		9.5', SP-SM - refer to 5.8', grades to reddish brown mottling.	wet brown with		S05	9.5	46-50	50/ 6"	12	12	65.8	23.8						
			11.0', SP - refer to 6.5'.		1/	S06		18-34-27	61	18	14								
			11.7', SP-SM refer to 5.8', grades to	wet.	X		12.5					47.1	16.3						
			12.5', grades to dense; grayish brow grayish-white mottling. All the fine of			S07		21-18-19	37	18	12	65.4 75.1	18.5						
			ŠILT.			S08	14	14-11-11	22	18	12	13.1	10.5						
271.05	15		14.0', grades to medium dense; gray reddish brown and gray mottling.	yisii dowii With	X	000	15.5	14411211	22	10	12	73.9	16.2					000000000000000000000000000000000000000	
266.05	20		(continued)																
			(continued)				F	REPORT T	TITL F									Н	OLE ID
			IFOD: III				E	BORING DIST.	Ģ RE	CO JNTY		RO	UTE	P	POSTN	/ILE			0013AR
	<b>a</b> C	Al	JFORNIA 🔍	URS HMM AR	LIP		F	PROJECT	OR B	RIDO	SE N	AME	rain	-					
			peed Rail Authority		-			Junioni		911	$-\nu c$	Ju I	1 UIII						

	ECT NA		h-Speed Train Fresno to Bakersfield													- 1		T NUN		
LOGG	ED BY oling		BEGIN DATE COMPLETION DATE Oct-19-11 Oct-20-11	BOREI N214	HO 46	LE L 714	OCA 433	TION (Lat	t/Long	or N	orth/l	East a	nd Da	tum) rid)		Н	DLE II			
DRILL	ING CC		CTOR/DRILLER	IN-SIT	U T	EST	ING			.00	. (	ia.ioi	10. 0	,		SL	JRFA	CE ELE	VATION	
	her/W ING ME			Stan DRILL	-	-	piez	zometer	•							_		•	NAVD88) IAMETER	
AUC	SER(0	'-6.5'	), ROTARY(6.5'-151.5')	Failir	ng	150										4	.875	in		
	LER TY (1-3/8		AND SIZE(S) (ID)					PE/HAMM D lbs, 30			р						AMME 88%	REFF	ICIENCY, ERI	
BORE	HOLE I	BACKE	FILL AND COMPLETION		ND	WA		DURING	B DRIL	LING	-				(DATE	) TO	DTAL		OF BORING	
Piez	omete	er		KEADII	ING			Not Re	cordec	1		N	ot Rec	orded		1	51.5	ft 		Т
Elevation (ft)	Depth (ft)	Material Graphics	Description		Sample Location		Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	25		20.0', grades to dense; grayish brown with brown mottling.		X	S09	20	21-18-28	46	18	16	76.5								
261.05	25		25.0', grades to grayish brown with reddish brown, brown, and grayish white mottling.		X	S10	25 26.5 28	16-18-16	34	18	14	78.6	24.5					1000000000000000000000000000000000000		
256.05	30-		30.0', grades to grayish brown with frequent reddis brown mottling.	sh	M	S11	30 31.5	13-14-20	34	18	18	62.4	21.7							
251.05	35		35.0', grades to very dense; reddish brown.  36.0', grades to grayish brown with reddish brown mottling.		X	S12	35 36.5	20-25-31	56	18	18	67.6						000000000000000000000000000000000000000		
-246.05	40																			
2	.0		(continued)																	
	<b>(</b>	A	LIFORNIA LURS I HIMMI A	RUP			E C	REPORT TO BORING TO STREET	COU OR B	RIDG	SE NA	AME	UTE	P	POSTM	/IILE			DLE ID D013AR	
	H	igh-	LIFORNIA Speed Rail Authority	- SPEED TR	MAN			Californ BRIDGE N					rain RED B	Y			DA	TE	SHEET	
		•	• •					321					ggi/T		rran		2-	20-12	2 of 8	

Calif	CT NA	a Hig	h-Speed Train Fre	esno to Bak	ersfield													1	3157	T NUN		
LOGGE A. Po	ED BY		BEGIN DATE Oct-19-11	COMPLETIC Oct-20-1	ON DATE	BORE N21	HO	LE L 714	OCA 433	TION (La 3 / E633	t/Long	or N	lorth/l	East a Jatio	ind Da nal G	tum) rid)			SOO 1	) 1 <b>3A</b> F	2	
DRILLI	NG CC		CTOR/DRILLER			IN-SI	ГUΤ	EST	ING				(,,	20		/		SL	JRFA	CE ELE	VATION	_
Pitch							-	-	piez	zometei	•									,	NAVD88)	
DRILLII AUG			) ), ROTARY(6.5'-15	1.5')		DRILL Fail			00										OREH 1.875		IAMETER	
			AND SIZE(S) (ID)							PE/HAMN	IER ID	)						_			ICIENCY, ERI	-
SPT										0 lbs, 30			-					- 1	88%			
BOREF Piezo			FILL AND COMPLETION	l		GRO! READ			ΓER	DURING Not Re			3 A		R DRIL ot Rec				51.5		OF BORING	
															(%		_	<u> </u>				_
Elevation (ft)	Depth (ft)	Material Graphics		Description			Sample Location		Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	40		40.0', grades to dense brown mottling.	; reddish brown	with grayish	l	$\mathbb{V}$	S13	40	39-18-18	36	18	18									
									41.5					84.7	26.6					000000000000000000000000000000000000000		
241.05	45		Poorly graded SAND (i reddish brown mottling weak cementation.	SP); very dense ; wet; trace SIL <sup>-</sup>	e; brown with T; fine SANI	);	X	S14	45 46.5	29-50	50/ 5.5"	12	11	38	15					<u>0000000000000000000000000000000000000</u>		
236.05	50		50.0', grades to reddis trace coarse SAND.	h brown; fine to	medium SA	ND;		S15	50	18-28-33	61	18	16							U I		
	$\exists$																					
231.05	55 =	TH	Poorly graded SAND w				1	S16	55	10-19-22	41	18	14									
226.05	60		grayish brown with red fine SAND; weak ceme		auriy, iew oil	-1,			56.5					77						20000000000000000000000000000000000000		
.20.05	-00		(continue	∍d)																		_
									E	REPORT BORING DIST.	Ģ RE				UTE	F	POSTN	/ILE		HC S(	DLE ID 0013AR	_
	<b>(</b>	CA	LIFORNIA	70	IRS   HMM   A	RUP				ROJECT												_
			Speed Rail Autho		CALFORNIA HO	- SPEED T	RAN			Californ BRIDGE N					rain RED B	Y			DA <sup>-</sup>	TF	SHEET	_
		-	<u> </u>	•											ggi/T		<u>ırra</u> n			20-12		

PROJE Calif	ornia		h-Speed Train	Fresno t	to Bakersfie	ld												1	131577		IBER
LOGGE A. Po			BEGIN DATE Oct-19-11		MPLETION DAT ct-20-11		EHOL 1467	E LC '14.4	CA7 133	FION (Lat / E633	t/Long 32311	or N 1.65´	lorth/ 1 (N	East a <b>latio</b> r	nd Da nal G	tum) rid)			OLE ID <b>3001</b>	3AF	3
DRILLI	NG CC		CTOR/DRILLER			IN-SI	TU TE	ESTI	NG				`					SI	JRFACE	ELE	VATION
Pitch DRILLI	er/W						indpi L RIG		iez	ometer	-										IAVD88) AMETER
AUG	ER(0	-6.5'	), ROTARY(6.5'-	151.5')		Fai	ling '	1500											1.875 i	n	
	ER TY		AND SIZE(S) (ID)							E/HAMM lbs, 30			าท						AMMER	EFFI	CIENCY, ERI
			ILL AND COMPLET	ION		GRO	UNDV	NATE		DURING			-	AFTER	DRIL	LING	(DATE			EPTH	OF BORING
Piezo	omete	r				REAL	DINGS	S		Not Re	corde	d		N	ot Rec	orded		_   1	151.5 f	t	
Elevation (ft)	S Depth (ft)	Material Graphics		Descrip	otion		_		Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)		Casing Depth	Remarks/ Other Tests
			60.0', grades to ve	ry dense.					60	12-26-27	53	18	14	71.8	24.3					 	
	70		Poorly graded SAN brown mottling; tra weak cementation.	ce SILT; fir	ense; brown with ne to medium S/	reddish AND;			65	12-19-26	45	18	12							000000000000000000000000000000000000000	
216.05	70		70.0', grades to ve medium-fine SAND	ry dense; r	eddish brown;				70	21-29-34	63	18	18	19.4						2	
211.05	75						\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		75	11-20-31	51	18	18								
206.05	-80		(conti	nued)								1	1	I	<u> </u>			<u> </u>	<u> </u>		
			·	-					В	EPORT T	G RE	CO				1 -	2007	A11 =		SC	LE ID 0013AR
		- A I		٨		0.4   450				IST.		JNTY			UTE		POSTN	/IILE		EA	
		.Al	LIFORNI	4	LIRS HM	M ARUP				ROJECT Californ					rain						
<b>T</b>	ш	ah (	Speed Rail Aut	Lauit.			-			RIDGE N		J	- 17 -	•							

PROJECT NAME  California High-Speed Tr OGGED BY BEGIN I A. Poling Oct-1		BORE			ATION (I 33 / E63								H	OLE II	77-00	1	
ORILLING CONTRACTOR/DRILLE Pitcher/W. Baker ORILLING METHOD	R	IN-SIT Star	TU TE ndpi . RIG	estino pe pi			1.05	1 (1	valiUl	iai G	iiu)		SI	URFA 286.0	CE ELE 05 ft (N	≺ EVATION NAVD88) IAMETER	_
AUGER(0'-6.5'), ROTARY(	•		_	1500	YPE/HAN	MACD II								4.875		ICIENCY, ERI	_
SAMPLER TYPE(S) AND SIZE(S) SPT(1-3/8")	(ID)				40 lbs,			ор						68%	EKEFF	ICIENCY, ERI	
OREHOLE BACKFILL AND COM Piezometer	PLETION	GROU READ			R DURII	NG DRI Recorde		G /		ORIL ot Rec				OTAL 1 <b>51</b> .5		H OF BORING	
					11001	1000.00	Ī										-
Elevation (ft) © Depth (ft) Material Graphics	Description			Sample Number		N-Value (bl/ft)	Penetration (in)		200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
grayish brown SILT; fine SA	d SAND with SILT (SP-SM); very den with reddish brown mottling; wet; fND; weak cementation.	ense; few		S21   80 81		50/ 5.5"	12	10	60.6	23					<u> </u>		
01.05 85———————————————————————————————————	to brown.			S22 85 86	5 31-31-4	14 75	18	17							<u> </u>		
	I SAND (SP); dense; brown; wet; tr dium SAND; weak cementation.	ace		523 90 91	11-14-5	56 70	18	7									
little SILT; tra	(SM); very dense; grayish brown; v ce medium fine SAND; weak	wet;		96		50/4"	10	9	90.9								
86.05 100 - 11.1 + 1 - 1	continued)										<u> </u>						-
	1100 1004	ARI ID			REPOR' BORIN	NG RI	ECC	′	RO	UTE	F	POSTN	MILE			DLE ID 0013AR	_
CALIFORI	VIA URS HMM	AKUP			PROJEC	T OR I	BRIDG ligh-	SE N	AME ed T	rain							
High-Speed Rail	Authority CALIFORNIA H	IGH-SPEED T	RAN	İ	BRIDGE			PI	REPAI		Υ			DA	TE	SHEET	-

Califo LOGGE	ornia	High	-Speed Train F	resno to Bakersfield	PODE	-LIO'	E 1 4	004	TION /I -	+/1	. c - k !	lort!- "	- took	nd D-	hi ibo ,		_	3157	7-00	
A. Po			BEGIN DATE Oct-19-11	COMPLETION DATE Oct-20-11					TION (La 5 / E633									OLE ID <b>3001</b>	3AF	₹
DRILLIN	IG COI		CTOR/DRILLER		IN-SIT	TU TI	EST	ING				`					SI	JRFACI	E ELE	VATION
Pitche DRILLIN			er		Star			piez	cometer	•										IAVD88) AMETER
			ROTARY(6.5'-1	51.5')	Fail			0									- 1	ЈКЕНО 1.875 i		AIVIE I EK
SAMPLE	ER TYF	PE(S)	AND SIZE(S) (ID)		SPT F	HAMI	MER	TYF	PE/HAMM								H	AMMER		CIENCY, ERI
SPT(			LL AND COMPLETIC	MAI.					) lbs, 30			•	ETED	DRILI	INC	/DATE		38%	EDTU	OF BORING
Piezo			LE AND COMFLETIC	JIN .	READ			LIX	Not Re			, ,		ot Rec		(DATE	- 1	51.5 f		OI BORING
														(%)		(9)		sf)		
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
10	00		Poorly graded SAND trace SILT: medium	(SP); very dense; brown; w fine SAND; weak cementation	vet; on.	M	S25	100	17-20-30	50	18	15								
181.05 10			105.0', grades to we	ak moderate cementation.			S26	105	29-50	50/6"	12	11	34.4	17.4					000000000000000000000000000000000000000	
176.05 1	10		110.0', grades to me	dium dense fine SAND.				110 111.5	12-12-17	29	18	15	67.1					≻		
171.05 11	115			with SILT (SP-SM); very de rown mottling; few SILT; fine ation.			S28	115 116.5	42-50	50/3"	9	11	54.3	26.8					000000000000000000000000000000000000000	
166.05 <del>-</del> 12	20	111	(contin	ued)														<u> </u>	211	
			· · · · · · · · · · · · · · · · · · ·	-					EPORT		-00	\D.D.								LE ID
									BORINO IST.		JNTY		RO	UTE	P	POSTN	/ILE		EA	0013AR
	<u> </u>	'ΛΙ	IE OPNII A	URS HMM	ARUP			Г	ROJECT	OP	יחוחי	2E N/	ME							
		AL	IFORNIA .	1	-				Californ					rain						
	▶ Hi	ah-S	peed Rail Auth	OTITY CALIFORNIA H	OM SPECO T	MARKET			RIDGE N					RED B				DAT	_	SHEET



Cali	ECT NA <b>forni</b> ED BY	a Hig	h-Speed Trai	in Fre	sno to	Bakersfield ETION DATE	BOD	EHO	IFI	004	TION /	at/l on	a or h	lorth/	Eact o	nd Do	tum\		1		77-00	MBER )
A. P			Oct-19-		Oct-2						TION (L 3 / E63										) 13A	R
			ACTOR/DRILLER				IN-SI												SI	JRFA	CE EL	EVATION
		/. Bak					Sta		•	piez	zomete	r									•	NAVD88)
			) ), ROTARY(6.	.5'-151	1.5')			L RIC ling		00										JREH 1.875		JIAIVIE I EK
			AND SIZE(S) (ID				SPT	HAM	MEF	RTYF	PE/HAM								H	AMME		FICIENCY, ERI
	(1-3/8										) lbs, 3			•					- 1	38%		
	omet		FILL AND COMPL	EHON			REAL			IER	DURIN Not R			<i>4</i> ز		t DRIL ot Rec		(DATE		) I AL  51.5		H OF BORING
																(%						
Elevation (ft)	Depth (ft)	Material Graphics			Description			Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
			Poorly graded S brown: wet: fine	SAND w	ith SILT (	SP-SM); very de cementation.	ense;	M	S29	120	38-41-5	91	18	9							)))))	Silt content may be overestimate
			121.0', coarser;	,	,					121.5											<u> </u>	fro 120 to end
161.05	_		SILTY SAND (S fine; interbedded cementation.	GM); ver d SANE	y dense; (	grayish brown; v ; some fines; v	wet; weak	X		125 126.2	20-27-3	3 65	18	14	73							
56.05	130		SILTY SAND (S				; wet;	<u> </u>		130 131.2	14-33-50	0 83/ 11"	17	13							$\triangleright$	
51.05	135		SILTY SAND (S				 ; wet;	M	S32	135	24-25-20	5 51	18	16							000000000000000000000000000000000000000	
								<u>/\</u>		136.5					65						<u> </u>	
46.05	140	11111	(co	ntinue	d)																	I
			<u> </u>		,					E	REPORT BORIN DIST.	IG R				UTE	F	POSTN	MILE			OLE ID 00013AR
	) H	CA ligh-	LIFORN Speed Rail A	IIA Lutho	rity	LIRS HMM	ARUP	TRAN			ROJEC Califor RIDGE	nia F	ligh-	Spe	ed T	RED B		ırran		DA	TE 20-1:	SHEET 2 7 of 8

	ECT N/ i <b>forni</b> :		gh-Speed Train Fresno to Bakersfield															T NUN 7 <b>7-00</b>	
LOGG	ED BY	<u> </u>	BEGIN DATE COMPLETION DATE Oct-19-11 Oct-20-11	BORE	HO	LE L	OCA	TION (La 3 / E633	t/Long	or N	lorth/	East a	nd Da	tum)		Н	OLE I	)	
	oling ING CO	NTR	ACTOR/DRILLER	IN-SIT				J / ⊏033	231	.00	1 (1)	valiUl	iai G	iiu)				13AF DE ELE	X EVATION
	her/W				-	-	piez	zometer	•									•	NAVD88)
	ING MI SER(C		D '), ROTARY(6.5'-151.5')	DRILL Fail			00										OREH 1.875		AMETER
SAMF	LER T	/PE(S	s) AND SIZE(S) (ID)	SPT F	HAN	1MEF	R TYI	PE/HAMN								H	AMME		ICIENCY, ERI
	(1-3/8		FILL AND COMPLETION					0 lbs, 30			•	FTER	וופח י	LING	/DATE		38%	DEDTL	I OF BORING
	comet		TILE AND COIVIL LETION	READ			ILIX	Not Re			, ,			corded	(DATE		151.5		TOT BORING
													(%)		(9)		sf)		
€		Material Graphics			ation	nber	Sample Depth (ft)	.⊑ਂ	ı E	(ii)	<u>-</u>	(%	Moisture Content (%)	(%)	Plasticity Index (%)		Shear Strength (tsf)		
Elevation (ft)	(#)	ıl Gra			Sample Location	Sample Number	Dep	per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	e C S	Liquid Limit (%)	ty Inc	Organics (%)	Stren	Drilling Method Casing Depth	
levati	Depth (ft)	ateria			ample	ample	ample	Blows	-Valu	enetra	900ve	00 W	oistur	quid	astici	rgani	ear (	illing	Remarks/
<b>—</b>	140	1144	Description interbedded SAND and SILT.		Š			<u>m</u> 19-22-37	<b>Ż</b> 59	18	16	72	Σ	<u> </u>		Ō	ळ		Other Tests
	145				X													000000000000000000000000000000000000000	
	Ξ						141.5												
	$\equiv$																		
	<u> </u>																		
	$\equiv$																		
141.05	145				ψ,	004	445	20.04.05		40	10								
	Ξ		SANDY SILT (ML); hard; grayish brown; wet; som SAND; low cementation.	ne	X	S34	145	22-24-35	59	18	13								
	Ξ				$\vdash$		146.5	5											
	=																		
	Ξ																		
	Ξ																		
	=																		
100.05	=																		
136.05	150		SILTY SAND (SM); very dense; grayish brown; w fine; little fines; low cementation.	et;	V	S35	150	20-24-32	56	18	17								
	=				$\mathbb{N}$		151.5	5										202	
	$\equiv$		Borehole terminated at a depth of 151.5' on										l					لـلطا	
1			10/20/2011. Piezometer installed.																
	Ξ		For corrosion test results, see Appendix E.																
	三		Soil moisture indicated as "wet" because SPT sar became wet during retrieval through rotary metho																
			drilling fluid. Soil moisture indication should not b used as an indication of a potential phreatic surfa	e															
131.05	155		free groundwater table.																
	=		See Borehole Log Legend for soil classification of and key to test data and sampler type.	nart															
			and to took data and sumpler type.																
	=																		
5	=																		
5	=																		
5																			
131.05	160																		
							1 -	DEDODT -	דודי ר									110	I E ID
8							E	REPORT S	3 RE	CO									DE ID 0013AR
								DIST.	COL	JNTY	,	RO	UTE	F	POSTN	/ILE		EA	
6			LIFORNIA LIRE HIMM	ARUP			F	PROJECT	OR E	RIDO	SE N	AME	roin						
			Speed Rail Authority	PH- SPEED T	RAN			Californ BRIDGE N			PF	REPAF	RED B				DA	TE	SHEET
į L		_	-									. Ma			ırran		2-	20-12	8 of 8

	CT NA	a Higi	h-Speed Tra BEGIN DA	in Fre	esno to	Bakersfield ETION DATE	PODE	⊔∩і	E I (	)(A)	TION (La	t/Long	or N	orth/l	Foot o	nd Do	tum)		1	3157	77-00	MBER )
	oodei		Oct-20-		Oct-2						/ E633									OLE 10	14A	R
			CTOR/DRILLER acken	₹			IN-SIT	U TI	EST	ING									- 1			EVATION NAVD88)
DRILLI			ROTARY(5'-8	01 51)			DRILL Mob															DIAMETER
			AND SIZE(S) (II								PE/HAMIN	1ER ID	)						_	8.75 i AMME		FICIENCY, ERI
SPT(	(1-3/8	3")					Auto	ma	atic,	140	) lbs, 30	)-incl	n dro	-					8	38%		
BOREH Neat			ILL AND COMPI	LETION	l		GROU READI			ER	DURING Not Re			6 A		DRIL ot Rec		(DATE		OTAL 31.5 f		H OF BORING
ITCUL	COLLIN	one gr	out								Hotric	Johnson	_				oraca				П	
Elevation (ft)	> Depth (ft)	Material Graphics			Descriptior	1			Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
		0.00	ASPHALT (7")					200	S01	0			60	60								
			AGGREGATE	`				707													{{	
	∄		SANDY SILT (I	ML); stif	ff; brown; n	noist; [ALLUVIUN	<b>∕</b> 1].	200													{{	
	Ξ							200							67.7							
	Ξ							200														
	=							00														
	=							200		5											}	
280.42	5—							M	S02	5	5-6-6	12	18	18								
	=							M		6.5					53.5	17.4						
	3	Ш				se; grayish brown		M	S03	6.5	7-9-7	16	18	16								
			brown mottling;	; moist;	some SIL	Γ; rapid dilatancy		M		8					40.9	14.9						
	=							Ħ	S04	8	6-8-9	17	18	15								
	∄							M		9.5					44.4	16			1.9		200	
275.42	10		SANDY CLAY some fine SAN cementation.	 (CL); sti ID; few \$	iff; brown v SILT; slow	vith white seams dilatancy; weak	;		S05	9.5	4-6-7	13	18	18	59.1	21.3	27	10				
	=							()	S06	11	500	17	10	14	59.1	21.3	21	10			<u> </u>	C06 and C07
			rapid dilatancy.		eaium aens	se; brown; little S	illi;	X		12.5	5-8-9	17	18	14	29.7	14.9					000000	S06 and S07 contains pinkish red contaminant along seams and partings
	=		SANDY CLAY	(CL); ve	ery stiff; bro	own; some SAND	 ).	M	S07	12.5	6-8-10	18	18	16								partings
	3							Д		14					58.9	21.4	65	49	3.4		MANNO	
	=		SILTY SAND (S SILT; rapid dila		edium dens	se; brown; wet; li	ttle	M	S08	14	7-11-12	23	18	15	21.0							S08 contains the contaminant
270.42	15							Д		15.5					21.6						<u> </u>	throughout sample Silt lens from
	∃																					14.3' - 14.5' and 14.6' - 14.8'
	=																					
																					000000000000000000000000000000000000000	
	=																					
	$\exists$																					
	3																					
265.42	_20	4111	(c)	ontinue	ed)																	
			, , ,	Juliut						R	EPORT	TITLE									H	OLE ID
			IEQ5)		_					E	SORING IST.	G RE	CO JNTY			UTE	F	POSTN	MILE			0014AR
	<u>)</u> (	ZAI	LIFORN Speed Rail A	NΑ	{	URS HMM	ARUP				ROJECT					rain						
	ш	iah (	Spood Pail	A I		1					RIDGE N				REPAF						TE	

PROJE <b>Cali</b>	forni		h-Speed Train Fresno to Bakersfield													_   1	315	77-00		
	ED BY oode	now	BEGIN DATE COMPLETION DATE Oct-20-11 Oct-21-11					TION (La I / E633									900.	) 14Al	R	
			ACTOR/DRILLER lacken	IN-SIT	TU 1	ΓEST	ING												EVATION NAVD88)	
DRILL	NG ME	THO	D	DRILL			`									В	OREH	OLE D	IAMETER	
	-		ROTARY(5'-81.5')  AND SIZE(S) (ID)	Mot SPT F				PE/HAMIV	IER ID	)							3.75 i Amme		ICIENCY, ERI	_
	(1-3/8		FILL AND COMPLETION					DURING			•	ETEE	וסח פ	LING			38%	DEDTI	H OF BORING	
	cem			READ			ILK	Not Re			, ,		ot Rec		(DATE	′ I	31.5 f		TOI BORING	
		S			_	_	Œ.						Moisture Content (%)		(%)		(tsf)			
(#)		Material Graphics			Sample Location	Sample Number	Sample Depth (ft)	r 6 in.	bl/ft)	Penetration (in)	(in)	(%) ر	Conte	Liquid Limit (%)	Plasticity Index (%)	(%)	Shear Strength (tsf)	Drilling Method Casing Depth		
Elevation (ft)	Depth (ft)	erial (			nple L	√ aldr	⊐ aldι	Blows per 6 in.	N-Value (bl/ft)	etratic	Recovery (in)	200 Wash (%)	sture	id Lin	sticity	Organics (%)	ar Str	ing M	Domorko/	
Ë	20-	Maţ	Description		San		_		_	_	_	200	Mois	Ligu	Plas	Org	She		Remarks/ Other Tests	_
	=				X	S09	20	6-9-10	19	18	15	43.8	8.2	_				<u>0000000000000000000000000000000000000</u>		
					<u> </u>	Y	21.5					43.0	0.2							
	=																	)))))		
	=																	<u> </u>		
	=																	<u> </u>		
260.42	25		25.0', grades dense.		$\bigvee$	S10	25	10-17-15	32	18	14									
	=				$\Lambda$	y.	26.5					25.3						000		
	=																			
	₫																	<u> </u>		
																		<u> </u>		
255.42	30 =		SAND with SILT (SP-SM); medium dense; reddisl		1/	S11	30	9-12-14	26	18	14									
	=		brown; wet; medium SAND; rapid dilatancy.		$\Lambda$	,	31.5					6	12.3					)))))		
	$\equiv$																	$\triangleright$		
																		)))))		
	=																	000		
250.42	35					010	25	56-18-18	26	10	10									
	<u> </u>		SILTY SAND (SM); very dense; reddish brown; medium SAND; some SILT; rapid dilatancy; weak cementation.		$\mathbb{N}$	S12		30-10-18	36	18	18	32.0	10							
			Servina de la companya de la company		$\Lambda$		36.5					33.9	12							
																		200000000000000000000000000000000000000		
	∃																	1000		
																		) ) )		
	. 🗏																			
245.42 <b>-</b>	40	1	(continued)							_				_						
								REPORT BORING		.CO	BU								DLE ID 0014AR	
								IST.	COL			RO	UTE	F	POSTN	/ILE		EA		
	<b>(</b>	A	LIFORNIA Speed Rail Authority	ARUP				ROJECT					rain							
	H	igh-	Speed Rail Authority	H-SPEED T	RAN			Californ BRIDGE N			PF	REPAR	RED B				DA	TE	SHEET	
											<u> </u> D	. Ma	ggi/⊺	<u>Г. Си</u>	rran		2-	20-12	2 2 of 5	

Calif	CT NA	a Higi	h-Speed Train I	Fresno to Ba	kersfield	DODE	IOI F	1.004	TION /I	t/l one		lorth/	Foot o	nd Do	tu una \		1	315	77-00	MBER )
	oode	now	BEGIN DATE Oct-20-11	COMPLET Oct-21-		N21	4396	0.18	TION (La 1 / E633	34723	or N 3.77	(Na	=ast a ationa	al Gri	tum) d)		5		14A	
			CTOR/DRILLER acken			IN-SIT	U TES	TING									- 1			EVATION NAVD88)
DRILLI	NG ME	ETHOD	)	-1\		DRILL											ВС	OREH	OLE C	DIAMETER
			ROTARY(5'-81.5 AND SIZE(S) (ID)	o')		Mob SPT H			PE/HAMN	/IER ID	)							3.75 i AMME		FICIENCY, ERI
SPT	(1-3/8	3")							0 lbs, 3								8	38%		
		ent gr	ILL AND COMPLET Out	ION		READI		AIER	DURING Not Re			jΑ		ot Rec		`	′	31.5 1		H OF BORING
														(%)		(%)		sf)		
Elevation (ft)	Depth (ft)	Material Graphics		Description			Sample Location	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
	40		SANDY CLAY (CL) SAND; medium pla	; hard; reddish br sticity; slow dilata	own; some fir incy.	ne	S1:	3 40 41.5	11-19-31	50	18	17	60.8	16.9	30	19	-			
240.42	45						S1	4 45 46.5	14-16-21	37	18	18	55.2	16.4	28	17			000000000000000000000000000000000000	
235.42	50		SILTY SAND (SM); oxide staining.	dense; reddish b	orown; with iro	<u> </u>	S1:	5 50 51.5	7-18-20	38	18	17	42.1	19.3					$\triangleright$	
230.42	55-		55.0', grades very o	dense; trace fine (	gravel.		S1	6 55 56.5	14-25-36	61	18	15							000000000000000000000000000000000000000	Gravel experienced fror 55.0' - 55.6'
225.42 <b>-</b>	-60		(conti	nued)																
									REPORT BORIN			RD								OLE ID 0014AR
									DIST.		JNTY			UTE	F	POSTN	ИILE		E/	
	<b>(</b>	CAI	LIFORNIA Speed Rail Aut	4	URS   HMM   A	RUP			PROJECT					·! ·						
	H	ligh-9	Speed Rail Aut	hority	CALFORNA HO	H-SPEED TR	AN		Califorr BRIDGE 1					rain RED B	Y			DA	TE	SHEET
		•	•	,												ırran		2-	20-1	2 3 of 5

	ECT NA		h-Speed Train Fresno	to Bakarefield															T NUN <b>77-00</b>	IBER	
LOGG	ED BY		BEGIN DATE C	OMPLETION DATE	BORE	HOI	LE LO	OCA	TION (La	t/Long	or N	orth/l	East a	nd Da	tum)		HC	OLE ID	)		
	Soode ING CC		Oct-20-11 (ACTOR/DRILLER	Oct-21-11	N21 IN-SIT				l / E633	4/20	).//	(IVE	iliona	ai Gri	u)				I 4AF	VATION	_
Gre	gg/D. l	McM	acken														2	285.4	2 ft (N	IAVD88)	
	ING ME SER(0		) ROTARY(5'-81.5')		DRILL													DREH 3.75 i		AMETER	
			) AND SIZE(S) (ID)		SPT F	HAM	MER	TYF	PE/HAMN								H/	AMME		CIENCY, ERi	
	(1-3/8		THE AND COMPLETION						) lbs, 30					, DDII	LING	/D A T E	- 1	38%	DEDT	OF BODING	
	t ceme		FILL AND COMPLETION rout		READ			EK	DURING Not Re			j A		t DRIL ot Rec		(DATE	.	31.5 f		OF BORING	
														(%)							$\Box$
		Material Graphics				tion	per	Sample Depth (ft)	c:		in)	_	<u> </u>	Moisture Content (%)	(%	Plasticity Index (%)		Shear Strength (tsf)	ا م		
Elevation (ft)	æ	Grap				Sample Location	Sample Number	Dept	per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Cor	Liquid Limit (%)	y Ind	Organics (%)	treng	Drilling Method Casing Depth		
vatic	Depth (ft)	terial				mple	mple	nple	Blows p	/alue	netra	cove	) Wa	isture	nid L	sticit	yanic	ear S	lling l	Remarks/	
E	-60	ă ⊠		ription			S17	Sal 8	요 17-26-36		18	18	200	ΜQ	Liq	Pla	Ö			Other Tests	4
	Ξ		SANDY SILT (ML); hard; re mottling; some fine SAND;	no dilatancy; weak		M	517	60	17-26-36	62	18	18							<u>OTTOROGOOD TOTOROGOOD /u>		F
	Ξ		cementation.			Δ		61.5					65.6	24.2							F
	=																				E
	∃																				
	Ξ																				
	=																				ŧ
220.42	65																				
220.42	65		SILTY SAND (SM); very de gray mottling; some SILT; v	nse; reddish brown wiveak cementation.	th	M	S18	65 61.5	22-30-30	60	18	18									
	=					M							37.1								Ė
	∃																				E
	=																				
	$\equiv$																				
	⊒																				Ė
	∄																				Ē
215.42	70					М	S19	70	19-28-37	65	18	17									F
	=					X		71.5					49.8	14.9							
	=					Н		-											>		
																					F
	⊣																				-
	=																				Ė
	$\exists$																				E
210.42	75	1111	SANDY SILT (ML); hard; re	ed and grayish brown;	 some	+	S20	75	16-21-20	41	18	18									-
	∃		medium SAND; trace subro dilatancy.			X		70 -					58.5	22.7							
	$\exists$		•			$\mathbb{A}$		76.5					00.0								F
	∃																				Ė
	Ξ																				Ē
																					Ė
	$\exists$																				F
205.42	80-																				
			(continued)					_											1.		
									REPORT T		CO	RD								LE ID 0014AR	
									DIST.		JNTY		RO	UTE	P	POSTN	/ILE		EA		
	<b>(</b>	A	LIFORNIA	URS HMM A	ARUP			P	ROJECT	OR B	RIDG	E N	AME_	'nc:							_
			Speed Rail Authority	CALIFORNA HG	H-SPEED TO	RAN			Californ BRIDGE N			PF	REPAR	RED B	Y			DA	ΓΕ	SHEET	
			. ,								_	D	. Ma	ggi/T	. Cu	rran		2-2	20-12	4 of 5	

ဖ
<del>-</del>
~
$\overline{}$
~
S
Ì
_
~
<u>.</u>
ຕ
>
N N
$\overline{}$
7
DEND
=
≍
7
4
2
5
ผ
$\geq$
SS .
% %
ĕ
_

	ECT NA		h-Speed Train Fre	sno to Baker	refield														77-0	IMBER N	
LOGG	ED BY		BEGIN DATE Oct-20-11	COMPLETION Oct-21-11	N DATE				TION (La 1 / E633								Н	DLE II	)		
			ACTOR/DRILLER	OCI-21-11		IN-SITU				4/23	0.77	(IVa	liona	ii Giii	u)		_		14A CE EL	EVATION	
			acken				<b>D</b> 10													NAVD88	
	ING ME SER(0		ROTARY(5'-81.5')			DRILL Mobi		0									- 1	)REH 3.75 i		DIAMETER	
			) AND SIZE(S) (ID)						PE/HAMN								H/	AMME		FICIENCY,	ERi
	(1-3/8 HOLE E		FILL AND COMPLETION	1					0 lbs, 30			•	FTER	DRILI	LING (	DATE		38% OTAL	DEPT	H OF BOR	ING
	t ceme					READII			Not Re						orded			1.5 1			
		s												t (%)		(%		tsf)			
£		aphic					atior	pth (f	Ë	Œ	(ii)	(L)	(%	onten	(%)	) xəp	(%	) dth (	pod 4	į	
Elevation (ft)	(#)	Material Graphics					Sample Location Sample Number	Sample Depth (ft)	per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method		
Eleva	Depth (ft)	/ateri	ı	Description			samp samp	Samp	Blows	-Vali	enet	Seco.	W 00	Aoistu	iquid	Plastic	Organ	Shear	rillin	Remai Other T	
_	-80			Boodiption			S21				18	16	(4			ш_		0)		1/4 inch thi	ck
	∃						M	81.5											MMM	80.0' - 80.5	
	∄	ШШ	Borehole terminated at	t a donth of 91 E'	on 10/21/20	111															
	85		Conducted SPT Samplexception of continuou	ling on 5 foot inter	rvals with th	ne															
	Ξ		Mud Rotary was used a claw drag bit. The bo	to create a 3 3/4 i	inch hole us	sing															
	∃		cement grout to the sa grouting inspector.																		
	_ =		For corrosion test resu	ılts, see Appendix	Ε.																
200.42	85		Soil moisture indicated																		
	90		became wet during retornation became wet during retornation for the during fluid. Soil moist	ture indication sho	ould not be																
	Ξ		used as an indication of free groundwater table		eatic surface	e or															
	∃		See Borehole Log Leg		fication cha	ırt															
			and key to test data an	nd sampier type.																	
	∃																				
195.42	90-																				
100.42	=																				
	$\equiv$																				
	Ξ																				
	$\exists$																				
	Ξ																				
190.42	95—																				
	$\exists$																				
	Ξ																				
	=																				
	Ξ																				
	=																				
185.42	100																				
								[	REPORT T	TITI F									Н	OLE ID	
								E	BORING DIST.	G RE	COI	RD	ROI	ITC		OSTN	/II ⊑			0014AR	
		٠,٨			5 HMM AR									J1E		US11	/IILE			^	
			LIFORNIA					_ (	PROJECT Californ	ia Hi	gh-S	Spe	ed T								
	Н	ıgh-	Speed Rail Autho	ority	CALIFORNIA HIGH-	SPEED TRA	AIN	E	BRIDGE N	IUMBE	R	PR D	EPAR Mag	ED B	Y . Cu	rran		DA 2-	TE 20-1	2 SHEE	
		_										_			_						

PROJE <b>Cali</b> f	forni	a Hig	h-Speed Train Fresno to Bakersfield												1	3157	77-0	MBER )
Loggi N. G	ED BY	•	BEGIN DATE COMPLETION DATE Oct-20-11 Oct-20-11	BORE			TION (La 2 / E633									OLE 10		
			CTOR/DRILLER		U TES										SU	JRFA	CE EL	EVATION
		MCM ETHO	acken	DRILL	PIG													NAVD88) DIAMETER
			, ROTARY(5'-81.5')		il B-8	)										3.75 i		JAWETER
			AND SIZE(S) (ID)				PE/HAMM										R EFI	FICIENCY, ERI
SPT			TILL AND COMPLETION			•	DURING			•	FTER	RDRIL	LING	(DATE		38% OTAL	DEPT	H OF BORING
Neat	cem	ent g	out	READ	INGS		Not Re	corde	t		N	ot Rec	orded	ì	8	31.5 f	t	
Elevation (ft)	Depth (ft)	Material Graphics	Description		Sample Location Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
$\Box$	0		ASPHALT (7") (AC).		S01	0			60	60							R	
	=		AGGREGATE BASE (9") (AB).		2000												{}	
	_		SANDY SILT (ML); brown; moist; some medium trace GRAVEL; [ALLUVIUM].	SAND;	2020												{{	
	Ξ				25.25						53.7							
	5				00						55.7							
	Ē				2020													
	_ =				25.05	5											}	
79.57	_	11111	SILTY SAND (SM); loose; grayish brown with red brown mottling; moist; mostly fine SAND; little fin	ddish es	S02	5	3-3-3	6	18	18								
			rapid dilatancy.	100,	Ň	6.5					17.5	7.5						
	Ξ		6.5', grades very dense.		S03	6.5	3-7-36	43	18	16								
	Ξ				M	8					21.5	11.1						Moderately
			SANDY SILTY CLAY (CL-ML); hard; brown with seams; moist; some fine SAND; little SILT; slow dilatancy; weak cementation.	white	S04	8 9.5	30-22-23	45	18	16	53.9	19.9	21	5	_			cemented from 7.5' - 9.0'
274.57	10		SILTY SAND (SM); loose; brown with white sean mostly fine SAND; some fines; slow dilatancy; we cementation.	- — — - ns; eak	S05	9.5	4-3-5	8	18	15	47.2	16.5					MMMM	
	=		Trace GRAVEL.		A Sne	11	3-4-6	10	18	15								
	_		CLAY with SAND (CL); stiff; grayish brown; little SAND.	fine				10	10	15	70.6	19.3	28	12				
	Ξ		SANDY SILT (ML); very stiff; gravish brown; wet	 ; low	/ S07	12.5 12.5		23	18	17	15	19.3					<u> </u>	
	Ξ		toughness.		X	14					59	20.1						
	-				/ S08		7-11-13	24	18	14								
269.57	15										60.2	-					<u> </u>	
.55.51	-				H	15.5												
	-																	
	_																	
	Ξ																	
	=																	
	=																	
64.57																		
υ <del>τ</del> .υ <i>ι</i>	-20-		(continued)															
							REPORT S			חם								OLE ID 60014R
							DIST.		INTY		RO	UTE	F	POST	ИILE		E	
(E)	<b>(</b>	Δ	LIFORNIA LIRS HMM	ARUP			PROJECT											
		ligh-	Speed Rail Authority	GH-SPEED T	RAN	(	Californ	nia Hi	gh-	Spe	ed T	rain RED B	· ·					CULT
		9	Production,				BRIDGE N	MOINIRE	-K					ırran		DA 2-2	1E 20-1	SHEET 2 1 of 5

1-16
ISR 1
RFP +
В3-
NDO
ADDE
2012/
6/29/
0

Cali	ECT NA <b>forni</b> a	a Hig	h-Speed Train Free	sno to Bakersfie														ROJEC 13157		
LOGG	ED BY Goode		BEGIN DATE Oct-20-11	COMPLETION DAT Oct-20-11	E BORE				TION (La 2 / E633									OLE ID		
			ACTOR/DRILLER acken		IN-SI7	TU 1	TEST	ΓING									SI	URFAC	E EL	EVATION NAVD88)
DRILL	ING ME	ETHOI	)		DRILL Mot			<b>.</b>									В	OREH	OLE D	DIAMETER
			ROTARY(5'-81.5')  AND SIZE(S) (ID)						PE/HAMM	MER ID	)							3.75 ii AMME		FICIENCY, ERI
	(1-3/8		FILL AND COMPLETION						0 lbs, 30			•	ETED	ווסח	LING	/DATE		88%	)EDT	H OF BORING
	t cem				READ	ING	SS	ı	Not Re			, ,		ot Rec			.	31.5 f		TO BOILING
		SS				_	_	(F)						ıt (%)		(%)		(tsf)		
Œ		Material Graphics				Sample Location	Sample Number	Sample Depth (ft)	per 6 in.	bl/ft)	Penetration (in)	(ii)	(%) ر	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	(%)	Shear Strength (tsf)	Drilling Method Casing Depth	
Elevation (ft)	Depth (ft)	erial G				nple L	nple N	De D	vs per	N-Value (bl/ft)	etratic	Recovery (in)	200 Wash (%)	sture (	lid Lin	sticity	Organics (%)	ar Str	ing Me	Demarks/
Е	-20 -20	Mat		Description			San		9-9-10	>   Z	La La 18	9 2 14	200	Moi	Liqu	Plas	Org	She		Remarks/ Other Tests
			SILTY SAND (SM); med some SILT; slow dilatar	aium aense; brownisn ncy.	gray; wet;	X	509			19	18	14								
							Y	21.5											$\overline{u} \overline{u} \overline{u} \overline{u} \overline{u} \overline{u} \overline{u} \overline{u} $	
	<u></u>																			
	=																		200	
9.57	25		SILTY SAND (SM); med subrounded; some SILT	dium dense; brownish	gray; wet;	1	S10	25	8-12-15	27	18	17								
	=		subrounded, some Sich	i , rapiù ullataricy.		X		26.5					43.9	12.6						
	<u>=</u>																			
	=																			
64.57	30—																			
			Poorly graded SAND (S brown; wet; medium; so			X	S11	30	6-7-9	16	18	14								
							Y	31.5												
	=																			
	Ξ																			
9.57	35 =		SANDY CLAY (CL); hai			1	S12	35	13-17-22	39	18	18								PP: 4.5 tsf TV: 2.5 tsf
	=		medium SAND; low plas	sticity; nigh ary streng	tn.	X		36.5					60.5		27	12	-			1 V. 2.3 (5)
	Ξ						<u>y</u>													
	$\equiv$																		<u> </u>	
	=																		<u> </u>	
	=																		<u> </u>	
4.57	40-																		<u>)</u>	
			(continue	d)				Ι-	DEDOCT :	TIT! -									1	01 F 10
								E	REPORT BORIN	G RE	ECO								S	OLE ID 60014R
		- 4	UEOD\$ !! 4	<b>N</b>					DIST.	COL	JNTY		RO	UTE	F	POST	MILE		E	4
1		LΑ	LIFORNIA	7	IM ARUP				PROJECT Californ					rain						
	Н	ligh-	Speed Rail Author	CALIFOR	NA HIGH-SPEED T	RAN			BRIDGE N			PF	REPAF	RED B		ırran		DA <sup>-</sup>	ΓΕ 20-1:	SHEET 2 of 5
													. ivid	უუ"		arruil			-0 1	_   2 0 0

	ECT NA		h-Speed Train Fresno to Bake	refield													ROJEC 1 <b>3157</b>			
LOGG	ED BY	_	BEGIN DATE COMPLETION Oct-20-11 Oct-20-11	N DATE   BC				CATION (I 22 / E63								Н	OLE ID	)		
DRILL	ING CC	NTRA	ACTOR/DRILLER				STIN		,5570	т.∪ <del>Ч</del> .	<u>~ (1</u>	•auOl	iui G	.14)		SI	JRFAC	E ELE	EVATION	
	gg/D. ING ME		acken	DE	RILL F	DIC													NAVD88)	
			ROTARY(5'-81.5')		/lobi		80										3.75 ii		IAIVIETER	
			) AND SIZE(S) (ID)					YPE/HAN 40 lbs,			on						AMME 38%	R EFF	ICIENCY, ERI	
	(1-3/8 HOLE E		FILL AND COMPLETION	I .				R DURII			•	AFTER	DRIL	LING	(DATE	- 1		DEPTH	OF BORING	
Nea	t ceme	ent g	rout	RE	ADIN	NGS		Not F	Recorde	ed		N	ot Rec	orded		8	31.5 f	t		_
		s				_	ے €	⊋					Moisture Content (%)		(%)		(tst)			
(#)		Material Graphics				catio	Sample Number	6 in.	(¥)	Penetration (in)	(ii)	(%)	onter	Liquid Limit (%)	Plasticity Index (%)	(%	Shear Strength (tsf)	thod		
Elevation (ft)	Depth (ft)	ial G				ole Lo		Blows per 6 in.	N-Value (bl/ft)	tratio	very (	200 Wash (%)	ure C	Lim	city I	Organics (%)	r Stre	ig Me		
Elev	Dept	Mate	Description			Sample Location	Sample Number	Blows	N-Va	Pene	Recovery (in)	200 \	Moist	Liquik	Plasti	Orgal	Shea	Drilling Method Casing Depth	Remarks/ Other Tests	
	40		SILTY SAND (SM); medium dense; red some CLAY; medium plasticity; slow dil	ddish brown; we			13 4	0 5-4-7	11	18								$\sim$		E
	$\equiv$		oomo o <u>u</u> m, moalam placessy, com an	iatarioy:		$\mathbb{N}$	41	.5				47.9	22.7							E
	∄																			
	∄																			
	Ξ																			F
	∃																			E
239.57	45																			
239.57	45		45.0', increasing fines content.			√s	14 4	5 4-6-8	14	18	17							<u> </u>		E
	$\equiv$					Δ	46	.5				49.4		28	17					E
	Ξ																			
	=																			
	$\equiv$																			E
	=																	000		E
234.57	45																			
20 11.07			SANDY SILT (ML); hard; slightly mottle oxidized staining; wet; some fine SAND	ed reddish brow ); weak	/n	\/\s	15 5	0 16-25-2	6 51	18	18							000000000000000000000000000000000000		
	Ξ		cementation.			Δ	51	.5				59.5	33.5	33	2					
	$\equiv$																			E
	$\exists$																			E
	Ξ																			E
229.57	55		CIL TV CI AV th CAND (CI MI ) hard			1 / 6	16 E	F 42.20 /	7 67	10	17	-						100		E
	$\exists$		SILTY CLAY with SAND (CL-ML); hard wet; little fine SAND.	i, brownish gra	у,	$\bigvee$	16 5		7 67	18	17	75 1	29.4	27	5			<u> </u>		
	$\equiv$					$\square$	56	.5				7 3.1	23.4	-						
	-																			F
	=																			
																				Ė
229.57																				
224.57	_60_=																			
<u> </u>			(continued)					REPOR <sup>3</sup>	TITI C									HC	DLE ID	
								BORI	IĢ RI	ECC			UTC	1 -	OOT.	AII =		S	0014R	
		- A		DE LINATIAN T	-			DIST.		UNTY			UTE		POSTN	/IILE		EA		
			LII OKINA 🔟	RS   HMM   ARUF				PROJEC Califor	nia H	ligh-	Spe	ed T				_				_
	Н	ıgh-	Speed Rail Authority	CALIFORNIA HGH-SPE	EED TRA	AIN		BRIDGE	NUMB	ER	PI	REPAR ). Ma	RED B	Y C. Cu	ırran		DA <sup>-</sup> 2-2	ГЕ 20-12	SHEET 3 of 5	
													ייטיי							

Cali	ECT NA	a Hig	h-Speed Train Fres	sno to Bakersfield														ROJEC 1 <b>315</b> 7		MBER )
LOGG	ED BY Goode	_	BEGIN DATE Oct-20-11	COMPLETION DATE Oct-20-11	BORE N21	НО 145	LE L 253	OCA .122	TION (La 2 / E633	t/Long 3704	or N 1.642	lorth/ 2 (N	East a	nd Da nal G	tum)			OLE 10		
			ACTOR/DRILLER acken		IN-SI												SI	JRFAC	E EL	EVATION
DRILL	ING ME	THO	)		DRILL															NAVD88) DIAMETER
			ROTARY(5'-81.5')  AND SIZE(S) (ID)		Mol				PE/HAMN	IER IC	)							3.75 i		FICIENCY, ERI
SPT	(1-3/8	3")			Aut	om	atic	, 140	) lbs, 30	O-incl	n dro	-					8	38%		
	HOLE I		FILL AND COMPLETION rout		GROU READ			ΓER	DURING Not Re			3 <i>F</i>			LING corded	(DATE		OTAL 1 31.5 f		H OF BORING
		Ĭ												(%)		<u></u>				
Ð		Material Graphics				ation	nber	Sample Depth (ft)	.⊑ਂ	_ ₽	(ii)	<u></u>	(%	Moisture Content (%)	(%)	Plasticity Index (%)	<u> </u>	Shear Strength (tsf)	pot ⊈	
Elevation (ft)	(ff)	al Gra				le Loc	le Nur	le Dep	per 6	la (bl/	ration	ery (ii	ash (	le C	Limit	ity In	ics (%	Strer	g Metl	
Eleva	Depth (ft)	Materi	D	escription		Sample Location	Sample Number	Samp	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moistu	Liquid Limit (%)	Plastic	Organics (%)	Shear	Drilling Method Casing Depth	Remarks/ Other Tests
_	-60-			M); dense; brownish gray;	wet;	V	S17	60	13-16-19	_	18	14	.,					0,		outer roots
	-		new SiE1, rapid dilatano	у.		Δ		61.5					11.1						000000000000000000000000000000000000	-
	Ξ																			,
219.57	65—		SII TV SAND (SM): don	se; mottled reddish brown		_	S18	65	11-19-24	43	18	15	-							
	Ξ		some fines.	se, mottied reddish brown	i, wci,	X	010		11-10-24	15	10	15								
	Ξ					$\vdash$		66.5					37.8							
	=																			
214.57	70		70.0', grades very dense	e.		$\bigvee$	S19	70	16-29-38	67	18	17								
	=					$\mathbb{N}$		71.5												
	Ξ																		$\triangleright$	
	Ξ																			'
	=																			
209.57	75		75 Ol grades mattled re	d with gravial brown			S20	75	10-39-50	89/	15	15	-							Reached refusal
			75.0', grades mottled re	d with grayish brown.		X	320		10-39-30	9"	15	15								at 50 blow counts; 3.25" left
	Ξ							76.5												to drive
	=																			
	=																			
																			000000000000000000000000000000000000000	
																			<u>)))))</u>	
204.57	-80	4174b	(continued	d)			l	I				<u> </u>		l		<u> </u>				
				-					REPORT											OLE ID
									BORINO DIST.		JNTY			UTE	F	POSTN	/ILE		E/	0014R A
	<b>(</b>	A	LIFORNIA	URS HMM	ARUP				ROJECT											
	H	igh-	Speed Rail Author	TO CALIFORNIA HIS	H-SPEED T	RAN			Californ BRIDGE N			PF	REPAR	RED B				DA	TE	SHEET
		•	•	•							•		). Ma			ırran		2-2	20-1	2 4 of 5



	_	_	
7	ì		
	·	•	
		_	
•	٠		
ľ	Y	_	
	•	5	
	<u>,                                     </u>	′	
	I	_	
	1		
L	ī		
,	V	,	
	•	-	
	ı	ı	
Ę	•	,	
		-	
	2		
	-	1	
	=	ζ	
L		J	
	2	2	
ī	ī	7	
	•	•	
	_	)	
ŕ	-	١	
	2	2	
•	Į	ί	
	•	4	
١		•	
ţ		)	
Ć		1	
	2	:	
١	?	?	
١	•	1	
i	è	ì	
	Ė	′	
١	_	)	

	ECT NA fornia		h-Speed Train Fre	esno to Bakers	sfield													315		JMBER ∩
LOGG	ED BY	_	BEGIN DATE Oct-20-11	COMPLETION Oct-20-11	DATE B				TION (La 2 / E633								Н	DLE II	)	
DRILL	ING CC	NTRA	CTOR/DRILLER	O01-20-11		N-SITU			_ / _000	57 04	.042	(17	auon	ai G	iiu <i>)</i>		SU		CE EI	EVATION
	gg/D. ING ME		acken			RILL F	DIC.													(NAVD88) DIAMETER
			ROTARY(5'-81.5')			Mobil		0										ЭКЕН 8.75 і		DIAIVIE I EK
			AND SIZE(S) (ID)						PE/HAMN 0 lbs, 30			n						AMME 38%	REF	FICIENCY, ERI
	(1-3/8 HOLE E		FILL AND COMPLETION	I	G	ROUN	IDW <i>A</i>		DURING			-	FTER	DRILI	LING (	DATE			DEP1	TH OF BORING
	t ceme				R	EADIN	IGS		Not Re	cordec	i		No		orded		8	1.5 f	t	T
		SS					د د	f)						Moisture Content (%)		(%)		(tsf)		
Œ		raphi				:	ratio	Sample Depth (ft)	per 6 in.	()  /#	(ii)	(jj	(%)	onter	Liquid Limit (%)	Plasticity Index (%)	(%	ngth	thod	
Elevation (ft)	Depth (ft)	rial G				-	ole Lo	le De	s per	lue (b	tratio	very (	Vash	one C	Lim	icity I	Organics (%)	r Stre	g Me	2
Eleva	Dept	Material Graphics	ı	Description		c	Sample Location Sample Number	Samp	Blows	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moist	Liquic	Plasti	Orgai	Shear Strength (tsf)	Drilling Method	Remarks/ Other Tests
	-80 					1	S2		27-50-90	140	18	18							_	
	$\equiv$					/	$\bigvee$	81.5											MMM	Possible hematite
	85		Borehole terminated at	t a depth of 81.5' or	n 10/20/201	11.	•		•										1	staining
	∃		For corrosion test resu	ılts, see Appendix E	≣.															
			Soil moisture indicated	l as "wet" because	SPT sampl	es														
	=		became wet during ret drilling fluid. Soil mois used as an indication of	ture indication shou	uld not be	or														
199.57	85—		free groundwater table	or a potentiai prirea	ilic suriace	OI														
	Ξ		See Borehole Log Leg and key to test data an		cation char	t														
			and noy to took data as	ia campioi typo:																
	$\equiv$																			
	Ξ																			
	∃																			
	Ξ																			
194.57	90-																			
	Ξ																			
	∃																			
7 1071	$\equiv$																			
3LD 7	Ξ																			
<u> </u>	=																			
189.57	95																			
3	$\equiv$																			
P P	Ξ																			
	∃																			
	=																			
n -184.57	100																			
189.57 18								1 -	DEBOE= -	F1=1 =									1.	101 5 15
3								L	REPORT S	3 RE		RD								OLE ID 80014R
			UE						DIST.		INTY		ROL	JTE	_   P	OSTN	/ILE		_ E	A
			LIFORNIA	3	HMM ARL	IP	•	F	PROJECT Californ	OR B	RIDG gh-S	E NA	ME ed Ti	rain						
	Н	igh-	Speed Rail Autho	rity	LIFORNIA HIGH-S	PEED TRA	N		BRIDGE N			PR	EPAR	ED B	Y . Cu	rran		DA 2-	TE 20-1	SHEET 2 5 of 5
												_ ∪.	ivia	191/ I	. ou	all				_   0 01 0

	ECT NA		h-Sneed Train Fre	sno to Bakersfield														3157		IMBER N	
LOGG	ED BY oling	·····y	BEGIN DATE Oct-18-11	COMPLETION DATE Oct-18-11	BORE	HO	LE L	OCA	TION (Lat 9 / E633	t/Long	or N	orth/	East a	nd Da	tum)		Н	OLE 10	)		
		NTRA	CTOR/DRILLER	OCI-10-11	IN-SIT				97 0000	7011	.090	יו) כ	ialiui	iai G	iiu)					EVATION	_
	ner/W				DDIII	DI											_		,	NAVD88)	
	ING ME SER(0		) ), ROTARY(6.5'-51.	5')	DRILL Faili			00										JREH 1.875		DIAMETER	
			AND SIZE(S) (ID)		I				PE/HAMM 0 lbs, 30			n.					- 1	AMME 88%	R EFF	FICIENCY, ERI	
	(1-3/8 HOLE E		FILL AND COMPLETION						DURING			•	FTER	DRIL	LING (	(DATE			DEPT	H OF BORING	
Nea	t ceme	ent gr	rout		READ	ING	S		Not Re	cordec	i	1	N	ot Rec	orded		5	1.5 f	ţ		_
		SS				_	Ĺ	æ						Moisture Content (%)		(%)		(tst)			
(#)		Material Graphics				Sample Location	Sample Number	Sample Depth (ft)	6 in.	()  /#	n (in)	(ii)	(%)	onter	Liquid Limit (%)	ndex	(%	Shear Strength (tsf)	thod #		
Elevation (ft)	Depth (ft)	rial G				ole Lc	ole Nu	ole De	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	iure C	d Lim	Plasticity Index	Organics (%)	r Stre	Drilling Method Casing Depth	ַתַ	
Elev	Dept	Mate		Description		Sam	Sam	Sam	Blow	N-Va	Pene	Reco	200 \	Mois	Liqui	Plast	Orga	Shea	Drillir Casi	Remarks/ Other Tests	
	0		SILTY SAND (SM); red SAND: some fines: wea	Idish brown; dry; fine to me ak cementation: [FILL].	dium	200	S01	0			60	60							T	2" of asphalt Bulk sample	E
	=		,			100													{{	taken in bucket	
	∄					1909													{{		E
	5					2000							34.5							Modified Proctor:	E
	<u> </u>					100													}	Max $\gamma_d$ = 130.3 pcf Optimum W <sub>i</sub> =	E
	₫					100													}	8.2%	
281.65	5—					10.0		5											{{		E
	$\exists$		5.0', grades very dense	e; decreasing fines content.		V	S02	5	1-19-30	49	18	18							{{		E
			Poorly graded SAND (S	SP); dense; light reddish br	own;	$\mathbb{A}$		6.5					20.9	7							E
	$\equiv$		moist to dry; fine to me cementation; [ALLUVIL	dium SAND; trace SILT; w JM].	eak	Æ	S03	6.5	33-32-19	51	18	9	16.7	14.3						Mud tub set at 6.5'	
	=			ith SILT (SP-SM); very der vet; fine to medium SAND;				8													
	10		fines; trace to medium cementation.			M	S04	8	8-12-15	27	18	17									E
	$\equiv$			edium dense; brown; wet; fi				9.5					33.9	19.7							Ħ
276.65	10		SAND; weak cementati			M	S05	9.5	9-11-16	27	18	18									
	<u> </u>					$\Lambda$		11					31.6								
	=		SANDY SILT (ML); har	d; light brown with reddish		-\/	S06	11	20-21-23	44	18	16									
	Ξ		brown mottling; wet; fin	nes; some fine to medium S SAND; weak cementation.	SAND;	$\triangle$		12.5					56.9	19.9							E
20/12	₫		SILTY CLAY with SANI	D (CL-ML); hard; light brow	 /n;	$-\bigvee$	S07	12.5	15-14-16	30	18	15									
LB 2//	$\exists$		wet; little SAND; weak	cementation.		Δ		14					72.5		24	4					
RY.G	15					X	S08	14	10-18-24	42	18	12							<u>0000000000000000000000000000000000000</u>		
271.65	15							15.5					75.7	21.7	23	5					E
5 보	=																				
3UP [	$\exists$																				
PJ A	$\exists$																				F
F-B.G	$\equiv$																				E
HSR R	Ξ																		<u> </u>		E
Д В О																			100		
-266.654 E	_20		(continue	ed)				_													
1.0.3 BOREHOLE LOG - CHSTP F-B. CHSR_F-B.GPJ ARUP DOTR LIBRARY.GLB 2/20/12  99 99 99 99									REPORT T		.CO	BU								OLE ID 80015R	
OT E									DIST.		INTY		RO	UTE	P	OSTN	/ILE		E		
	<b>(</b>	A	LIFORNIA	URS HMM A	RUP				PROJECT												
BOI W			Speed Rail Author	rity CALFORNA HO	H-SPEED T	RAN			Californ BRIDGE N			PF	REPAF	RED B				DA		SHEET	
.0			-	•										ggi/T		rran			20-1		

Calif	CT N. <b>forni</b>	a Hig	h-Speed	Train Fr	esno to	Bakeı	rsfield													1	315	77-0	IMBER <b>0</b>	_
LOGGE A. Po				N DATE :-18-11		PLETION t-18-11	I DATE					TION (La 9 / E633								- 1	OLE 10		}	
		ONTRA '. Bak	CTOR/DRIL er	LER				IN-SI	TU T	EST	ING							-		SI	JRFA	CE EL	EVATION (NAVD88)	
DRILLI			), ROTAR	V(6 5'-5'	I 5')			DRIL Fai			าก												DIAMETER	
	ER T	YPE(S)	AND SIZE(	· ·	1.5)			SPT	HAN	IMEF	R TYF	PE/HAMN			ga					H	1.875 AMME 38%		FICIENCY, ERI	-
			ILL AND CO	OMPLETIO	N			GRO	UND	WA		DURING			•	FTER	RDRIL	LING	(DATE	- 1		DEPT	H OF BORING	-
Neat	cem	ent gi	rout					REAL	DING	S		Not Re	corde	d		N	ot Rec	orded		5	1.5 f	t		_
Elevation (ft)	Depth (ft)	Material Graphics			Descript	ion			Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method	Remarks/ Other Tests	
	<b>-</b> 20			ND (SM); deme fines; w			fine to med	dium	V	S09	20	12-18-26	44	18	15	44.3	15.6					<b>E</b>	20.0', switch to 4	4"
261.65	25		Poorly gra	ded SAND ; fine to me ND; weak o	SP); der	se; light b	brown; wei	<u>;</u> ;			21.5													
.51.55			brown mot cementation	ND (SM); ditling; wet; fon. les to fine r	ine SANE	); some fi	vith reddisi nes; weak	n	X	S10	25 26.5	11-15-16	31	18	18	30.8	22.1					000000000000000000000000000000000000		
256.65	30		brown with medium S SILT (ML)	ded SAND n reddish br AND; few fi ; hard; gray ium SAND;	own mott nes; wea ish browr	ling; wet; k cementa n; wet; fev	mostly fine ation.  v fine SAN	e to	X	S11	30 31.5	10-17-23	40	18	12	6.5 85.5	21.2							
	35		grayish bro fines; wea SANDY SI	ded SAND own with re k cementat LT (ML); ha SAND; wea	d mottling ion. ard; reddi	g; wet; find  sh brown;	e SAND; fo			S12	35 36.5	21-21-24	45	18	16	56.4	17.5					000000000000000000000000000000000000000		
246.65┕	40			(continu	red)																			_
											E	REPORT BORIN DIST.	Ģ RI				UTE	F	POSTI	MILE			OLE ID 80015R A	_
	) F	CA ligh-	LIFOF Speed Ro	AIVIS	ority	LIRE	S   HMM   A	RUP	TRAN			PROJECT Californ BRIDGE N	nia H	igh-	Spe	ed T	rain RED B	Y			DA	TE 20-1	SHEET 2 of 3	_

Califo	T NAME rnia Hig	h-Speed Train Fre	sno to Bakersf	ield	_,	:	0.61	TION: "								1	315	77-00	
ogged A. Poli	BY	BEGIN DATE Oct-18-11	COMPLETION DA	ate   Bore	≣ΗΟ 141	LE L 424	OCA .139	TION (La 9 / E633	t/Long 3 <b>701</b> 1	or N 1.693	orth/l 3 (N	≣ast a latior	nd Dat	tum) rid)			OO?	15R	
RILLING	S CONTRA	ACTOR/DRILLER		IN-SI							`			- /		SL	JRFA	CE ELE	EVATION
	r/W. Bal			DDIII	l DI											_		•	NAVD88)
		D '), ROTARY(6.5'-51.	5')	DRILI Fail		ع 150	00										.875		IAMETER
		) AND SIZE(S) (ID)		I				PE/HAMM								H/	AMME		ICIENCY, ERI
SPT(1-		FILL AND COMPLETION		II.				DURING			•	FTER	DRII I	ING	/DATE	1 1	88%	NEDTL	OF BORING
	ement g			REAL			LIX	Not Re			, ,		ot Rec				1.5 f		TOI BOIGING
													(%)		(%)		sf)		
	Deptin (II) Material Graphics				ation	nber	Sample Depth (ft)	.⊑	æ	(j.	_	(%	Moisture Content (%)	(%)	Plasticity Index (%)	_	Shear Strength (tsf)	اع اق	
Elevation (ft)	(II)				Foc	Sample Number	Dep	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	C C	Liquid Limit (%)	ty Inc	Organics (%)	Stren	Drilling Method Casing Depth	
Elevation	eptin ateria				Sample	eldui	ımple	3 swc	Value	netra	эсоле	o Wa	oistur	l pink	astici	ganic	ear (	illing	Remarks/
40		SILTY SAND (SM); der	Description	wet: fine		S13	8 40	面 14-14-16		18	گ 14	20	ž	<u> </u>	Ē	ō	र्ष	-	Other Tests
	3	SAND; some SILT; wea		wet, iiie	X			14 14 10		.0		49.8	17.5						
					Н		41.5												
																		<u>0000000000000000000000000000000000000</u>	
	3111																		
11.65 45	<u> </u>	45.01				C14	45	16 22 25	67	18	16								
	3111	45.0', grades to very de	ense.		M	S14	45	16-32-35	67	18	16								
					Д		46.5												
	3111																		
36.65 50	<u>, 3111</u>																		
00.00		SILTY CLAY (CL-ML); brown mottling; wet; tra	hard; grayish brown ace fine SAND; weak	with reddish	M	S15	50	20-26-29	55	18	17	91.9		25	4				
	$\exists$	cementation. Poorly graded SAND (S			igwedge igwedge		51.5												
	_	brown; wet; fine SAND; Borehole terminated at	; few SILT; weak cer a depth of 51.5' on	mentation. 10/18/2011.	/				•	•									
	3	For corrosion test resul	lts, see Appendix E.																
	=	Soil moisture indicated	as "wet" because S	PT samples															
	-	became wet during retr drilling fluid. Soil moist	ure indication should	d not be															
31.65 55	5—	used as an indication o free groundwater table.		c surface or															
01.00	<u> </u>	See Borehole Log Lege		ition chart															
	<u> </u>	and key to test data and	d sampler type.																
	_																		
	=																		
	4																		
	╡																		
26.65₩60	)——																		
								REPORT											OLE ID
								BORINO DIST.		ECO JNTY		RO	UTE	F	POSTM	1ILE		SI EA	0015R
	$C\Lambda$	LIEODNIIA	7																
<b></b>			URSIF	HMM ARUP			1 -	$D \cup I = \cup \bot$	OD D		E N14	\ N / I							
	UI:-L	LIFORNIA Speed Rail Author	3	HMM ARUP				ROJECT Californ BRIDGE N	ia H	igh-	Spe	ed T	rain RED B				DA		SHEET

	ECT NA		h-Speed Train Free	sno to Bakersfield															T NUN		
LOGG	ED BY	_	BEGIN DATE Oct-26-11	COMPLETION DATE Oct-27-11					TION (La								Н	DLE IE	)		
	Sooder	-	CTOR/DRILLER	IN-SIT				2 / E633	38080	0.27	1 (1)	latior	iai G	ria)				16R CE ELE	VATION		
			acken														_		•	NAVD88)	
	ING ME FARY(				DRILL Mob			)										0REH 6.25 i		AMETER	
			AND SIZE(S) (ID)						PE/HAMN			H/	AMME		ICIENCY, ERI						
	(1-3/8 HOLE E		TILL AND COMPLETION						DURING				FTER	DRIL	LING	(DATE		38% OTAL	DEPTH	OF BORING	
	omete				READI				Not Re					ot Rec		`	′ I	60 ft			
Elevation (ft)	Depth (ft)	Material Graphics	C	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	0 =	000	ASHPHALT (5") (AC).	TI) (A.D.)		200	S01	0			60	60							<u> </u>		
	$\equiv$	368	fine SAND; trace GRAV	wn; moist; subrounded; so	me	2000															
	5		[ALLUVIUM].			1505													000000000000000000000000000000000000000		
	=					200							61.1								Ħ
	=					000													200		
283.82						00		5													
283.82	5		5.0', grades grayish bro	own; wet.		M	S02	5			18	18	62.5	11.8	19	3					
	$\equiv$					Μ							02.5	11.0	19	3			000		
	=																				
	=																				
	=																		1000		
	=																				H
278.82	10	++++	SILTY SAND (SM); den			$\bigcup$	S03	10	12-15-16	31	18	16									
	=		medium; subrounded; s oxidation seams.	some SILT; slow dilatancy;		M				31	10	10	30	11.9					200		
	=		Oxidation scams.			Α		11.5						11.0							
0/12	=======================================																		100		Ħ
B 2/2	3																				
RY.GL																					E
273.82	15			dense; brown; little SILT;		$\bigvee$	S04	15	6-6-8	14	18	16							200		
OTR [	=		oxidation seams.			M		16.5					24.4								
RUP																					
P. A	=																				
F-B.C	=																				
HSR.	₫																				
o m -268.82	20-																				
200.02	-20		(continue	d)																	
1.0.3 BOREHOLE LOG - CHSIP F-B CHSR F-B.GPJ ARUP DOTR LIBRARY GLB 2/20/12									REPORT BORIN			RD								LE ID 0016R	
)TE CC								DIST.		JNTY		RO	UTE	F	POSTN	/ILE		EA			
		A	LIFORNIA	URS HMM	ARUP				PROJECT					rain							
)3 BC	Н	gh-	Speed Rail Author	CALIFORNIA HIS	California High-Speed Train  BRIDGE NUMBER   PREPARED BY   DATE   SHI D. Maggi/T. Curran   2-20-12   1								SHEET	-							
<b>=</b>											_   D	. Ma	ggı/T	. Cu	ırran		2-2	20-12	1 of 9		

MODIFIED BY   SERINATE   CORP.   COR		JECT N liforn		h-Speed Train I	Fresno to B	akersfield															77-00		
SIMPLE CELEVATION   SURPRISE	LOG	GED B	·	BEGIN DATE	COMPLE	TION DATE																	
BORE-NOLE DAMPTER   ROTARY(POT-1607)   Mobil B-80   Sole B-101   Sol							IN-SIT	UΤ	EST	ING									SI	JRFA	CE ELI		
SAMPLER TYPE(S) AND SIZE(S) (ID)	DRIL	LING N	IETHO	D															В	DREH	OLE D		
BOORPILE BACKFILL AND COMPLETION   READINGS   Not Recorded   160 ft   160							SPT H	IAM	MER	TYF									H	AMME		ICIENCY, ERI	
Piezometer   READINGS   Not Recorded   Not Record				FILL AND COMPLET	ION										FTER	DRIL	LING	(DATE	- 1		DEPTI	H OF BORING	
283.82 26 Poorly graded SAND with Sil.T (SP-SM); medium dense; brownish gray, wet; medium; subrounded; few Sil.T; rapid dilatancy; mostly quartz.  283.82 30 30.0°, oxidation partings.  283.82 38 38 38 5 E-10-12 22 18 13 7.1 15.2																ot Rec		1	′ I				
283.82 25 Poorty graded SAND with SILT (SP.SN); medium dense; brownish gray, welt, medium; subrounded; few SiLT; rapid dilatancy; mostly quartz.  288.82 30 30 30.0°, oxidation partings.  288.82 36 30 30.0°, oxidation partings.	Elevation (ft)	Depth (ft)	Material Graphics												200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
253.82 35 Section 2 22 18 13 7.1 15.2 Section 2 23 82 40 Section 2 24 82 82 40 Section 2 24 82 82 82 82 82 82 82 82 82 82 82 82 82		20			dense; reddish b	orown; some S	ILT;	M	S05	20	28-36-23	59	18	16	00.5	44.7					M		E
253.82 35	263.82	25-		dense; brownish gr	ay; wet; mediun	n; subrounded;	few		S06	25	9-11-16	27	18	13							000000000000000000000000000000000000000		
- <b>L</b> 248 82 <b>L</b> 40 <b>L</b> 34 <b>L</b> 34 <b>L</b> 34 <b>L</b> 34 <b>L34 L34 <b>L34 L34 L34 L34 L34 L34 L34 L34 L34 L34 </b></b>				30.0', oxidation par	tings.			X		31.5											V - I		
(continued)  REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High Speed Train	248 83	-						X		36.5					7.1	15.2					000000000000000000000000000000000000000		
REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High Speed Train				(conti	nued)																		_
High-Speed Rail Authority  High-Speed Rail Authority  BRIDGE NUMBER   PREPARED BY DATE   SHEET D. Maggi/T. Curran   2-20-12   2 of			CA High-	LIFORNI/ Speed Rail Aut	URS HMM A	ARUP H-SPEED TO	RAN		D P	BORING DIST. PROJECT Californ	COL COL OR B	RIDG gh-	SE N/ Spe	AME ed T	rain RED B	Y		/ILE	DA	S EA	0016R		

	ECT NA <b>forni</b> a		h-Speed Train Fresno to Bakersfield														ROJEC 1 <b>315</b> 7		MBER )	
LOGG	ED BY	_	BEGIN DATE COMPLETION DATE Oct-26-11 Oct-27-11	BORE N21	HO	LE L	OCA	TION (La 2 / E633	t/Long	g or N	lorth/	East a	nd Da	tum) rid)		Н	OLE IE	)	-	
DRILL	ING CC	NTR/	ACTOR/DRILLER	IN-SIT				_ ,		1	. (1		0	/		SI	JRFAC	CE ELI	EVATION	
	gg/D. ING ME		acken	. RI	G										_		•	NAVD88) DIAMETER		
ROT	ARY(	0'-16	60')	Mob	oil E	3-80										6	3.25 i	n		
	LER T\ (1-3/8		) AND SIZE(S) (ID)	1				PE/HAMM 0 lbs, 30			эр					- 1	HAMMER EFFICIENCY, ERI 88%			
BORE	HOLE I	BACKI	FILL AND COMPLETION	JND	)WA		DURING	3 DRII	LING	•		DRIL		(DATE	E) TO	OTAL I		H OF BORING		
Piez	omete	er		READ	ING	55		Not Re	corde	d		N	ot Rec	orded		1	160 ft			
		S			u	<u>_</u>	(H)						Moisture Content (%)		(%)		Shear Strength (tsf)			
(ft)	_	Material Graphics			Sample Location	Sample Number	Sample Depth (ft)	per 6 in.	(bl/ft)	Penetration (in)	(in)	200 Wash (%)	Conte	Liquid Limit (%)	Plasticity Index (%)	(%)	ength	Drilling Method Casing Depth		
Elevation (ft)	Depth (ft)	erial (			J eldr	Jple №	] ald	vs pe	N-Value (bl/ft)	etrati	Recovery (in)	Wasl	sture	id Lir	sticity	Organics (%)	ar Str	Drilling Metho Casing Depth	, Damandar/	
Ше	JeC 40	Mat	Description		San			Blows			_	200	Moi	Liqu	Plas	Org	She		Remarks/ Other Tests	
			40.0', trace partings of black mafic minerals in the bottom 2 inches of the sample.	9	X	S09	40	6-7-12	19	18	11	14.4								
							41.5													
	45																	<u> </u>		
	$\exists$																	200		
	=																			
43.82	45		CIL TV CAND (CM) dense real districtions			S10	45	16-15-19	34	18	15	-							Black portings in	
	=		SILTY SAND (SM); dense; reddish brown; wet; subrounded; medium little SILT; black mafic mine	ral	X	510	45	16-15-19	34	18	15	17.9							Black partings in the top 3" and the bottom 2" of S10	
			partings.		$\mathbb{A}$	,	46.5												sample	
	∃																	000	,	
	$\exists$																	<u> </u>		
	$\exists$																			
	$\exists$																			
38.82			SANDY SILTY CLAY (CL-ML); very stiff; gravish			011	50	10-11-15	26	18	18	-								
			brown; wet; little SAND; low plasticity; high dry strong medium toughness.	ength;	$\mathbb{N}$	١١١			20	10	10	37.6	15.3							
			CLAY with SAND (CL); very stiff; grayish brown; v	 wet;	$\mathcal{L}$	ļ	51.5					73.3	23.7	30	14					
	=		little SAND; medium plasticity; high dry strength; medium toughness.																	
	=																			
33.82	55		SILTY SAND (SM); very dense; reddish brown; w			S12	55	12-20-30	50	18	13							000000000000000000000000000000000000000		
			fine to medium; some SILT.	υι,	X	012				10	13	33.3	13.5							
						,	56.5													
	=																			
	$\equiv$																	100		
	=																			
28.82	_60		(const. B															Ø		
			(continued)					REPORT T	TITI E										OLE ID	
							E	BORING	G RE	ECO		- F.C		T =	2007	=		S	0016R	
		- A	LIEODY II A					DIST.		JNTY			UTE	F	POSTN	/IILE		EA	<b>\</b>	
			LIFORNIA URS I HIMMI A	ARUP			F (	PROJECT Californ	OR E	RIDC igh-	SE N	AME ed T	rain							
	Н	igh-	Speed Rail Authority									TE 20-12	SHEET 2 3 of 9							
									$\perp \nu$	ı. ıvıd	yyı/ I	. U	ıııdil		Z-4	<u> </u>	<u> </u>			

	ECT NA		h-Speed Train Fresno to Bakersfield														ROJEC		MBER )		
LOGG	SED BY		BEGIN DATE COMPLETION DATE Oct-26-11 Oct-27-11	BORE N21	НО 138	LE L 779	.0CA	TION (Lat 2 / E633	:/Long 8686	or N 5.27	orth/l	East a	nd Da nal G	tum) rid)			OLE 10				
			ACTOR/DRILLER acken	IN-SI7												SI	JRFA	CE EL	EVATION		
DRILL	ING ME	THO	)	DRILL												_			NAVD88) NAMETER		
	TARY		(O') AND SIZE(S) (ID)	Mob				PE/HAMM	FR ID							_	6.25 i		ICIENCY, ERI		
SPT	(1-3/8	3")		Auto	om	atic	, 140	) lbs, 30	)-incl	n dro	•					{	88%				
	HOLE I		FILL AND COMPLETION	GRO! READ			TER	DURING Not Re			6 A		DRIL ot Rec				otal i 160 ft		H OF BORING		
													(%)		(9)						
æ		Material Graphics			ation	mber	Sample Depth (ft)	. <u>:</u>	(£)	(ii)	<u></u>	(%	Moisture Content (%)	(%)	Plasticity Index (%)	(9)	Shear Strength (tsf)	BU			
Elevation (ft)	(ft)	ial Gr			le Loc	Sample Number	le De	Blows per 6 in.	N-Value (bl/ft)	ration	/ery (i	/ash (	Z e z	Liquid Limit (%)	city In	Organics (%)	Stre	g Met			
Eleva	Depth (ft)	Mater	Description		Sample Location	Samp	Samp	Blows	N-Val	Penetration (in)	Recovery (in)	200 Wash (%)	Moist	Liquid	Plasti	Orgar	Shear	Drilling Method Casing Depth	Remarks/ Other Tests		
	-60- -		·		V	S13	60	19-28-32	60	18	18										
					$\setminus$		61.5					42.7	14.9								
																		<u> </u>			
	₫																				
	$\exists$																				
	=																				
223.82	65		Poorly graded SAND with SILT (SP-SM); dense;		-	S14	65	12-14-16	30	18	11										
	=		brownish gray; wet; medium; subrounded; few SIL oxidized partings.	Т;	X	,	66.5					9	15.5								
	=						00.5														
	₫																				
218.82	70 =		SANDY SILT (ML); hard; brownish gray to reddish brown; wet; some fine SAND; weak cementation; the same statement of the same stateme	two	$ \bigvee $	S15	70	14-29-69	98	18	18								Calcite and weak cementation		
	=		distinct calcite seams 1/2 inch thick.		$\Lambda$	,	71.5					52.7	20						layers at 70.5' - 70.55' 70.3' - 70.35',		
	Ξ																		varies from no to moderate		
	<u> </u>																		cementation		
	Ξ																				
213.82	75		75.0', grades very stiff; grayish brown; little SAND;		7	S16	75	5-12-18	30	18	15										
	=		trace GRAVEL; low plasticity; slow dilatancy; no cementation.		X		76.5					64.4	24.9	22	2						
					Γ	4	70.5														
213.82																		000000000000000000000000000000000000000	-		
	=																				
200.00	90																	000			
<b>-</b> 208.82	<b>-</b> 8∪		(continued)	_															,		
								REPORT T		.CO	RD								DLE ID 0016R		
-200.02								DIST.		INTY		RO	UTE	F	POSTN	/ILE		EA			
			LIFORNIA QURS HMM IA	RUP				ROJECT					rain								
	H	igh-	Speed Rail Authority	- SPEED T	RAN			RIDGE N			PF	REPAF	RED B				DA		SHEET		
Ь											⊥ D	. Ma	ggi/1	. Cu	ırran		2-2	20-1 <i>2</i>	2 4 of 9		

Cal	ECT N	a Hig	h-Speed Train Fre	sno to Bakersfie	ld												1	3157	T NUI 77-00				
	ED BY Goode		BEGIN DATE Oct-26-11	COMPLETION DAT Oct-27-11					TION (La 2 / E633									OLE 10	16R				
			ACTOR/DRILLER acken		IN-SI	TU 1	ΓEST	ING									- 1			EVATION NAVD88)			
DRILL	ING MI	ETHO	)		DRIL	L RI	G										_			IAMETER			
	TARY		60') ) AND SIZE(S) (ID)		Mo				PE/HAMM	ארם ום								3.25 i		ICIENCY ED			
	(1-3/8		AND SIZE(S) (ID)						) lbs, 30			р						HAMMER EFFICIENCY, ERI 88%					
	HOLE		FILL AND COMPLETION		GRO REAL			ΓER	DURING Not Re			NG AFTER DRILLING (DAT						OTAL 60 ft		H OF BORING			
1 102	Onici	J1							Notite	Coracc					oraca	_	'						
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests			
	<b>-</b> 80		SILTY SAND (SM); der SILT; weak cementatio		t; some	Ŵ	S17	80	9-15-26	41	18	18											
			SIL1, Weak Cerrentatio			<u> </u>		81.5					46.3	22					000000000000000000000000000000000000000				
203.82	85		SAND with SILT (SP-S) few SILT.	M); dense; grayish bro	wn; wet;		S18	85	16-19-21	40	18	15											
	Ξ					Δ	ļ	86.5					10.3										
198.82	90		SILTY SAND (SM); ver some SILT.	y dense; grayish browi	n; wet;		S19	90	21-30-40	70	18	18							000000000000000000000000000000000000000				
193.82	95		95.0', grades dense; litt	tle SILT.			S20	91.5	12-20-25	45	18	18	43.7	15.6					<u> </u>				
188.82	100							96.5					26.9	18.7					000000000000000000000000000000000000000				
100.02	100		(continue	ed)																			
									REPORT .		CO	RD								DLE ID 0016R			
_									DIST.	COU	JNTY		RO	UTE	P	POSTN	/ILE		EΑ				
		ZA	LIFORNIA		ROJECT					rain					-								
	H	ligh-	Speed Rail Author	rity CALFORN	IA HIGH-SPEED	TRAN		California High-Speed Train  BRIDGE NUMBER   PREPARED BY   DATE   SHEET   D. Maggi/T. Curran   2-20-12   5 of								SHEET 5 of 9	_						
				CALIFORNIA High-Speed Rail Authority											D. Maggi/T. Curran								

PROJECT NAME  California H	igh-Speed Train Fresno to Bakersfield	L										1	31577		BER
OGGED BY  N. Goodenov	BEGIN DATE COMPLETION DATE	N2138779											OLE ID 80016	R	
	RACTOR/DRILLER	IN-SITU TES	TING				•			-		SI	JRFACE	ELEV	
Gregg/D. Mcl		DRILL RIG													AVD88) METER
ROTARY(0'-	160')	Mobil B-8	0									6	3.25 in		
SAMPLER TYPE( SPT(1-3/8")	S) AND SIZE(S) (ID)	SPT HAMME Automatic					าท					- 1	AMMER 38%	EFFIC	CIENCY, ERI
, ,	KFILL AND COMPLETION	GROUNDWA		•			•	FTER	DRILI	LING	(DATE			PTH (	OF BORING
Piezometer		READINGS	T	Not Re	cordec	i		N	ot Rec	orded		1	60 ft		
Elevation (ft)  Depth (ft)  Material Graphics	Description	Sample Location Sample Number		Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Casing Depth	Remarks/ Other Tests
	Poorly graded SAND (SP-SM); dense; brown; w medium to coarse; subrounded; few SILT.	ret; S21	100		43	18	18						XXXX		
83.82 105	. 105.0', grades medium dense; grayish brown.	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	101.£ 105.£	12-14-15	29	18	12	7.7	19.7						
78.82 110	110.0', grades dense; brown.  SILTY SAND (SM); dense; brown; wet; fine; son	IΧI	3 110	22-14-19	33	18	18	12.5							
73.82 115	SANDY SILT (ML); hard; brown with gray seams			18-30-63	93	18	18	44.7	25.9						
	some fine SAND; slow dilatancy.	5, WGI,			33	10	10	55.3	20.3						
		<u>/ \</u>	116.					. 55.5	20.3				XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
68.82 120	(continued)				I		<u> </u>					<u> </u>		<u> </u>	
	. ,			REPORT BORING	Ģ RE			- FC	UTE	Τ.	2007	AII =		S00	.E ID 016R
	LIEODY II A			DIST.		JNTY			UTE	F	POST	/IILE		EA	
SA CA	ALIFORNIA I-Speed Rail Authority	ARUP		PROJECT Californ					rain						
High	1-Speed Rail Authority	HOH-SPEED TRAIN		BRIDGE N					RED B	.,			DATE		SHEET

ROJECT NAME <b>California High-Speed Train Fresno to Bakersfi</b> e	eld											1	13157	T NUN		
OGGED BY BEGIN DATE COMPLETION DAY N. Goodenow Oct-26-11 Oct-27-11	TE BORE	HOLE 13877	ELOCA 79.582	ATION (La 2 / E633	at/Long 38686	or N 3.271	orth/l 1 (N	East a <b>latio</b> r	nd Da nal G	tum) rid)			OLE 10			
RILLING CONTRACTOR/DRILLER			STING				`					SI	JRFAC	E ELE	EVATION	_
Gregg/D. McMacken RILLING METHOD	DRILL	BIG												,	NAVD88) IAMETER	_
ROTARY(0'-160')		oil B-	80										3.25 i		IVINIT I EK	
AMPLER TYPE(S) AND SIZE(S) (ID)				PE/HAMN 0 lbs, 3			n						AMME 38%	R EFF	ICIENCY, ERI	
SPT(1-3/8") OREHOLE BACKFILL AND COMPLETION	GROU	JNDW		DURIN			-	FTER	DRIL	LING	(DATE			DEPTH	H OF BORING	_
Piezometer	READ	INGS		Not Re	ecorde	d		N	ot Rec	orded		1	60 ft			_
Depth (ft) Material Graphics  Description			Sample Number Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	\$
CLAY (CL); hard; olive brown; wet; few SANI plasticity; slow dilatancy.	D; medium	₩ <sup>sa</sup>	25 120	15-26-33	59	18	18							<u> </u>		
33.82 125			121.5	11-14-18	3 32	18	12	88	32.7	38	15			000000000000000000000000000000000000000		
SANDY SILT (ML); hard; light olive brown; w fine SAND; trace medium SAND; slow dilatar	ncy.		126.5			15	14	51.6	25.3					<u>0000000000000000000000000000000000000</u>		
SILTY SAND (SM); dense; light grayish brow medium; some SILT.  Laminated from 131.0 to 131.6 feet.	vn; fine to	X	131.			18	18	40.6								
Poorly graded SAND with SILT (SP-SM); der brownish gray; fine SAND; few fines.	nse; light	Si	28   135   136.£	12-13-17	30	18	16	12.4	33.5					<u> </u>		
(continued)																
			_ I	REPORT BORIN DIST.	G RE				UTE	F	POSTN	ИILE			DLE ID 0016R	-
CALIFORNIA TURBE	MM ARUP			PROJECT												_
High-Speed Rail Authority			L	Califorr	nia H	igh-	Spe	ed T								
riigii-speed kuli Auliloriiy	THE STEED I	- Anni	E	BRIDGE 1	NUMBI	ER	PF	REPAF	RED B ggi/T	Ա	ırran		DA 2-1	TE 20-12	SHEET 7 of 9	ג

	ECT NA		h-Sneed Train Fr	esno to Bakersfiel	d														T NUN		
LOGG	SED BY	_	BEGIN DATE	COMPLETION DATE	BORE	EHO	LE L	OCA	ATION (La	it/Long	or N	lorth/	East a	ind Da	tum)		Н	OLE IE	)		
	Goode		Oct-26-11	Oct-27-11	IN-SI				2 / E633	oooot	0.21	ı (N	vatioi	iai G	ria)			300° JRFA		VATION	
	gg/D.																			IAVD88)	
	ING ME TARY(				DRILI Mol			`									- 1			AMETER	
			AND SIZE(S) (ID)						PE/HAMN	IER ID	)						_	3.25 i AMME		CIENCY, ERI	
SPT	Γ(1-3/8	")			Aut	om	atic	, 14	0 lbs, 30	0-incl	h dro	•					8	38%			
	HOLE E		TILL AND COMPLETIO	N	GRO READ			TER	DURING Not Re			3 A		ORIL ot Rec		`	<b>,</b>			OF BORING	
1 162	20111616	1				T			NOUNC	Corde	<u></u>		IN		Jorded		<u> </u>	60 ft			$\top$
		S				Ľ	<u>_</u>	Œ						Moisture Content (%)		(%)		Shear Strength (tsf)			
Œ		raph				catic	quin	epth	6 in.	0/ft)	i)	(ii)	(%)	Sonte	it (%	ndex	(%)	angth	pth of		
ation	ر#) ر	ial G				le Lo	le N	e D	ber :	ne (k	ratio	/ery	Vash	nre (	Ë	city I	) soir	Stre	g Me		
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Aoist	Liquid Limit (%)	Plasticity Index	Organics (%)	Shea	Drilling Method Casing Depth	Remarks/ Other Tests	
	140		140.0' grades mediur	m dense; frequent brown s	seams.	1/	S29				18	14	14			ш.		0)		01101 10010	士
	]					X		141.5	=				9.7	32.7							E
	=							141.5													E
	=																				E
	145																		<u>0000000000000000000000000000000000000</u>		Ē
	=																				F
143.82	145																				E
	=		Poorly graded SAND brown; fine; trace fine	(SP); medium dense; lighes; rapid dilatancy; freque	nt	M	S30	145	15-11-16	27	18	17									E
	=		brownish red partings	s; occasional black parting	S.	$\Lambda$		146.5	5												
	I∃																				E
	=																				E
	=																				F
	l∃																				E
138.82	150	Ш	SILTY SAND (SM); n		 own to	-	S31	150	12-11-14	25	18	18									F
			grayish brown; wet; n	nedium; fine little fines; ra n brown oxidation seams.	pid	IX.							20.2	30.8							E
	▋∃		,,			1	1	151.5	9				20.2	30.0							E
	=																				E
4																					
27.7	I∃																				E
9																					E
122.02	155																				E
133.62	155-																				E
2	=																				F
5	=																				E
2	<b>1</b>																		000000000000000000000000000000000000000		E
5.9																					E
۲.																					
5																					E
133.857 133.85	160	<b> </b>	(continu	ued)																	
2			(continu	ieu)				F	REPORT	TITLF									HO	LE ID	
3								E	BORIN	G RE	ECO				1-	OCT:	AII =		S	0016R	
			UE						DIST.		JNTY	_	_ RO	UTE	_   F	POSTN	/IILE		EA		_
			LIFORNIA		ARUP			F	PROJECT Californ	OR E	RIDO	SE N	AME ed T	rain							
d (2)	H	igh-9	Speed Rail Auth	ority CALFORNA	HGH-SPEED T	TRAN			BRIDGE N			PF	REPAR	RED B				DA	TE	SHEET	
												D	. Ma	ggi/1	ı. Cu	ırran		2-2	20-12	8 of 9	

Cali		High-Speed																	T NUM <b>77-00</b>	BER	
	ED BY Sooder		IN DATE t-26-11	COMPL Oct-2	ETION DATE 27-11		EHOLE 1 138779											00°	16R		
		NTRACTOR/DRI McMacken	LLER				TU TEST					•					SL	JRFA	CE ELE	VATION AVD88)	
DRILL	ING ME					DRILL	RIG	)									ВС		OLE DIA	AMETER	
SAMP	LER TY	PE(S) AND SIZE	(S) (ID)				HAMMEI										HA	MME		CIENCY, EF	Ri
	(1-3/8	") BACKFILL AND C	OMPLETION	J			omatic <sub>UNDWA</sub>					-	TERI	ORILI	ING (	DATE		88% TAI	DEPTH	OF BORIN	G
	omete			•		READ			Not Re			,		Reco		<i>D7</i> (1 L)	'	60 fl		Or Borting	
Elevation (ft)	Depth (ft)	Material Graphics		Descriptior	ı		Sample Location Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks Other Tes	
123.82 118.82	165	10/27/201 The scree logging w performer grouting i For corros Soil moist became v drilling flu used as a free grout	en is located as performed as performed to the satisfunspector. Sion test resulture indicated vet during retid. Soil mois in indication andwater table	ter was inst from 130.0 d for this bo faction of th ults, see Ap d as "wet" b trieval throu- ture indicat of a potenti e.	alled down to 1 to 150.0°. No F rerbole. Grouting the City of Fresh pendix E.  secause SPT saigh rotary metholon should not lal phreatic surfact classification of lal classification of lal classification of lal classification of lal phreatic surfact classification of lal phreatic surfact classification of lal phreatic surfact classification of land surface classificatio	ong was of the second s															
<b>-</b> 108.82	180							רי	DOBT.	דודו ר									LIC	EID	
								В	PORT ORING	Ģ RE		RD			1 -	0.5==			S0	E ID 016R	
			DN II A		¬				ST.	COU			ROU	ΓE	P	OSTM	ILE		EA		
		ALIFO			LIRS   HMM	ARUP			ROJECT aliforn					ain							
	Н	igh-Speed R	ail Autho	rity	CALFORNIA H	GH-SPEED T	TRAN		RIDGE N			PRE	PARE	ED BY		rran		DA 2-	TE 20-12	SHEET 9 of	9
												ַ ט.	muy	<b>5"</b> '	. <u> </u>				1_	1 0 01	

	ECT N/		sh Chand Train Evenue to Delravatiold																MBER	П
LOGG	ED BY	a mig	Jh-Speed Train Fresno to Bakersfield  BEGIN DATE COMPLETION DATE					TION (La								Н	<b>3157</b> DLE ID	)	-	
	Poling	NITO	Oct-25-11 Oct-27-11 ACTOR/DRILLER					1 / E634	10038	3.382	2 (N	latior	nal G	rid)			3001		EVATION	4
	her/W			IN-SIT Star				zometei	r							- 1			NAVD88)	
	ING ME			DRILL	. RI	G										ВС	DREH	OLE D	DIAMETER	
			'), ROTARY(6.5'-151.5') ) AND SIZE(S) (ID)	Fail				PE/HAMM	/ED IF								1.875		FICIENCY, ERI	_
	(1-3/8		) AND SIZE(S) (ID)	I				0 lbs, 30			ор						88%	IN LI I	ICILINOT, LIN	
			FILL AND COMPLETION	GROL READ			ΓER	DURING			3 A		DRIL		DATE	′ I			H OF BORING	
Piez	omete	er		INLAD	IIVC			Not Re	ecorde	<u>а</u>		N	ot Rec	oraea		1	<u>51.5</u>	ft		$\forall$
Elevation (ft)	Depth (ft)	Material Graphics	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
			ASPHALT (4") (AC). SILTY SAND (SM); brown; dry; fine to medium;			S01	0			60	60								Hand auger to 5.0'	I
			subangular; some SILT; trace GRAVEL; weak cementation; [FILL].		0.0000000000							43.3						<del>}</del>	Modified Proctor: Max γ <sub>d</sub> = 125.4 pcf Optimum W, =	
	=				000													}	7.6%	Ħ
285.54					000		5											$  \cdot  $		
205.54	10—		SANDY SILT (ML); very stiff; grayish brown; mois dry; some fine SAND; weak cementation; [ALLUV	t to IUM].	X	S02	5	5-8-8	16	18	12							$ \{\} $		
	=			•			6.5					64.7								
	Ξ																		Set mud tub at 6.5'; 4.875" drag	Ħ
	$\equiv$																		bit	
	∃																		,	Ħ
	=																			Ħ
	∃																			
280.54	10-		10' Grades hard; grayish brown to brown; wet; sor fine-medium SAND; weak to moderate cementation	me on.	=	S03	10	50	50/ 3"	3	1								10.0', driller notes hard material	
	=						11.5													H
	₫																			E
, I	Ξ																			
100/1	$\equiv$																			Ħ
JLB 2	Ξ																			Ħ
74. 2																				
275.54	15	++++++++++++++++++++++++++++++++++++	SILT with SAND (ML); hard; grayish brown; wet; li		//	S04	15	18-17-15	32	18	15	74.3						<u> </u>	15.0', wood debris in cuttings	Ħ
<u> </u>			SAND; trace medium to coarse SAND; low plastic weak cementation.		11		16.5					14.3						<u> </u>	acons in cultings	
5			Poorly graded SAND (SP); dense; grayish brown; fine to medium; trace fines; weak cementation.	wet;																
Ž																				Ħ
ָ פֿ	=																			H
70 1	₫																			
5																		<u> </u>		Ħ
270.544 ARUF 1.0.3 BOARTHOLE LOG - CHORT - B. GP. ARUF DO I KILBRART GLB ZIZOLI ARUF DO I KILBRA	_20		(continued)						1									$\cong$		뮈
5			(continued)				F	REPORT	TITLF									H	OLE ID	$\dashv$
3							E	BORINO	Ģ RE			DO:	UTE	-	OSTN	AII E			0017R	4
		- A	LIEODNII A	מוום									UIE		0011	IILE			<b>-</b>	_
		A	LIFORNIA URS HMM IA	WELL STATES				PROJECT Californ			Spe	ed T								
5.7	Н	ıgh-	Speed Rail Authority	H-SPEED T	RAIN		E	BRIDGE N	NUMBI	ĒŔ	PF D	REPAR . Ma	RED B'	Y . Cu	rran		DA <sup>2</sup>	ΓΕ 20-1:	SHEET 2 1 of 8	

Calif LOGGE	CT NAME <b>Ornia Hi</b> q ED BY	gh-Speed Train Fresno to Bakers BEGIN DATE COMPLETION D	Sfield DATE BOR	REHOLF	LOCA	TION (La	at/Lond	or No	orth/l	East a	nd Da	tum)		1		77-00	/IBER
A. Po	oling	Oct-25-11 Oct-27-11	N2	13610	2.464	4 / E634								5	3001	17R	
	NG CONTR	ACTOR/DRILLER		ITU TE		zomete	r										VATION NAVD88)
DRILLIN	NG METHO	DD	DRII	L RIG		20111616	1									•	AMETER
		5'), ROTARY(6.5'-151.5')		iling 1											1.875		
		S) AND SIZE(S) (ID)				PE/HAMN 0 lbs, 3			n					- 1	AMME 38%	R EFFI	ICIENCY, ERI
	(1-3/8") HOLE BACK	(FILL AND COMPLETION				DURING			-	FTER	DRIL	LING	(DATE			DEPTH	OF BORING
Piezo	ometer	Т		DINGS		Not Re					ot Rec		`		51.5		
Elevation (ft)	Depth (ft) Material Graphics	Description			Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
		SILTY CLAY with SAND (CL-ML); hard; gi wet; little medium to coarse SAND; weak o	rayish brown; cementation.	S	21.5		59	18	14	72.1		21	4			000000000000000000000000000000000000	
	25	Poorly graded SAND with SILT (SP-SM); in dense; grayish brown; wet; fine to medium weak cementation.		Sí	26.5		29	18	12	13.5						000000000000000000000000000000000000000	
260.54	30	30' Grades to medium SAND.		S	07 30 31.5		25	18	16	7.7							
255.54	35	35' Grades brown; fine-medium SAND.		S	08 35 36.5	38-18-8	26	18	8							000000000000000000000000000000000000000	
250.54	40	(continued)															
					F	REPORT BORIN	TITLE		ΒD								DLE ID 0017R
						DIST.		JNTY	עח	RO	UTE	F	POSTN	ЛILE		EA	
(	A C A	LIFORNIA TURS	HMM ARUP		-	PROJECT		SDIDO	E NI	∆N/⊏							
		LIFORNIA -Speed Rail Authority			[	Californ	nia H	igh-S	Spe	ed T	rain						
V	High-	-Speed Rail Authority	FORNA HIGH-SPEED	TRAN		BRIDGE N				REPAR		v			DA	TE 20-12	SHEET 2 of 8

PROJECT Califo LOGGED	rnia Hig	BEGIN DATE	esno to Bakersfield COMPLETION DATE	BORE				TION (La								<b>1</b>	1 <b>3157</b> OLE ID		
A. Poli	ng	Oct-25-11	Oct-27-11	N21	36	102.	.464	/ E634								8	3001	7R	7 (ATION:
	3 CONTR r/W. Ste	ACTOR/DRILLER ewart		IN-SIT Star				omete	r										VATION NAVD88)
DRILLING	3 METHO	D	4 -10	DRILL	RIC	3										ВС	DREH	OLE DI	AMETER
		5'), ROTARY(6.5'-15 6) AND SIZE(S) (ID)	1.5')	Faili				PE/HAMN	/ED IF	<u> </u>							1.875		ICIENCY, ERI
SPT(1	-3/8")			Auto	oma	atic,	140	) lbs, 3	0-inc	h dro	-					6	88%		
	LE BACK	FILL AND COMPLETION	I	GROU READ			ER	DURING Not Re			3 A		DRIL ot Rec		(DATE				OF BORING
i iczuli	110101			1				NOLINE	Journal			IN		Jiudu			51.5	11	
Elevation (ft)	Deptin (π) Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
		SANDY SILT (ML); har SAND; low plasticity; w	rd; grayish brown; wet; son yeak cementation.	me fine	X	S09	40 41.5	9-12-18	30	18	8	62.4		22	3				
245.54 45	5 III III III III III III III III III I		nse; reddish brown; wet; f race coarse SAND; weak	 ine to			45 46.5	18-18-23	41	18	12	31.6						<u> </u>	
240.54 50		50' Grades very dense brown mottling; fine.	; grayish brown with reddi	ish	X		50 51.5	50	50/ 6"	6	6	46.2						$\bowtie$ 1	
235.54 55	1]       <sub>5</sub>	55' Grades to reddish SILT.	brown; fine to medium; litt	le	X	S12	55 56.5	27-27-27	54	18	8	22.3							
230.54—60		(continue	ed)				  -		TIT' =										1510
							E	EPORT BORIN IST.	G RE	ECC JNTY		RO	UTE	F	POSTN	/ILE			DE ID 0017R
	$C^{\Lambda}$	HEODNIA	URS HMM	ARUP				ROJECT											
		LIFORNIA -Speed Rail Autho	. 1	-				Californ	nia H	igh-	Spe	ed T							
	High.	opeea Kali Autho	CALIFORNIA H	KIH-SPEED T	RAN		В	RIDGE N	NUMB	ER		REPAR . Ma					DAT	ге 20-12	SHEET 3 of 8

	ECT NA		h-Speed Train Fresno to Bakersfield															T NUN		$\Box$
LOGG	ED BY Poling		BEGIN DATE COMPLETION DATE Oct-25-11 Oct-27-11	OCA	TION (La 1 / E634	t/Long	g or N	lorth/	East a	ind Da	tum)		Н	OLE I						
		NTR	ACTOR/DRILLER	IN-SIT				+ / =034	10036	5.302	Z (I	Natio	iai G	iiu)					VATION	$\dashv$
	her/W						pie	zometer	-									,	IAVD88)	
	ING ME		D '), ROTARY(6.5'-151.5')	DRILL Faili			າດ										OREH 1.875		AMETER	
			) AND SIZE(S) (ID)					PE/HAMM	1ER ID	)						_			CIENCY, ERI	_
SPT	T(1-3/8	3")						0 lbs, 30			•					- 1	68%			
	HOLE I		FILL AND COMPLETION	GROL READ			TER	DURING Not Re			3 <i>F</i>		DRIL ot Rec		(DATE		OTAL 151.5		OF BORING	
1 102	Omet	<i>-</i> 1						Notite	Corac	<u> </u>				oraca		<u>'</u>				П
		S			uc	Ē	Œ						Moisture Content (%)		Plasticity Index (%)		Shear Strength (tsf)			
Œ		iraph			ocation.	qwn	epth	6 in.	ol/ft)	li E	(ii)	(%)	Sonte	it (%	lude	(%)	ength	thoc sthoc		
Elevation (ft)	h (ft)	ial G				le N	le D	s per	lue (k	tratic	very	Vash	nre (	_ Ein	city	Jics (	r Stre	g Me		
Eleva	Depth (ft)	Material Graphics	Description		Sample	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moist	Liquid Limit (%)	Plasti	Organics (%)	Shea	Drilling Method Casing Depth	Remarks/ Other Tests	
	60-	ĺ	60' Grades dense; some fines.		17	S13	60	13-15-17	32	18	14	- (4		_			0,		0 4101 1 0010	Ħ
					X		61.5					30.2	-							Ħ
							01.5													
																				E
	<u> </u>																			E
	=																			E
																				E
225.54	65—																			E
1220.0			65' Grades very dense; grayish brown; fine to med	dium.	X	S14	65	25-31-41	72	18	10									E
							66.5													
																				F
	▋																			
220.54	65		SANDY SILT (ML); hard; grayish brown; wet; som	 e fine	1/	S15	70	17-22-22	44	18	12	-						000000000000000000000000000000000000		
	_		SAND; weak cementation.		$\triangle$		74.5					61.7								E
	∣≡						71.5													E
																				E
7	<u>                                     </u>																			E
777	I∃																			E
GE																				E
215.54	75																			
			SILTY SAND (SM); very dense; reddish brown; w fine to medium; some SILT; weak cementation.	et;	$\mathbb{N}$	S16	75	30-31-50	81/ 11"	17	17							$\overline{\mathcal{M}}$		F
3	=		75.8' Grades to grayish brown with seams of redd brown 1/16" to 1/8" long and variegated white.	ish	$\Lambda$		76.5					45.1								E
P			mile.																	E
2																				F
L L																				
Ϋ́	╛																			E
<u>ت</u> م	=																			E
20.01 BOXENOLE LOG - CHOIN P. B. CHOX F. B. CHO AND DO IN LIBRARY (SLB ZZD) 12.01.2	L <sub>80</sub>	4 (4 4 )	(continued)							1								$\simeq$		上
<u> </u>			(continuos)				F	REPORT	TITLF									НО	LE ID	_
3							E	BORING	Ģ RE	ECO				1-	OCT:	AII =		S	0017R	
								DIST.		JNTY		RO	UTE		POSTM	/IILE		EA		
摲 🥟			LIFORNIA LIRES HIMMIA	RUP				PROJECT Californ					rain							
X	H	igh-	Speed Rail Authority	H-SPEED T	RAIN			BRIDGE N			PF	REPAI	RED B					TE	SHEET	
<b>ᡸ</b> لــــــا											D	ı. Ma	ggi/ገ	. Cu	rran		2-	20-12	4 of 8	

Califo OGGE	ornia D BY	ME Higl	n-Speed BEGI	Train IN DATE	Fresno	to Bak	cersfield ON DATE	BORE	EHO	LE L	OCA <sup>-</sup>	TION (La	nt/Lond	or N	lorth/	East a	nd Da	tum)		1		T NUN <b>77-00</b> 0		_
A. Po	oling		Oct	t-25-11		Oct-27-1		N2	136	102	.464	/ E634								5	003	17R		_
Pitch			CTOR/DRII vart	LLER				IN-SI				omete	r										VATION NAVD88)	
DRILLIN	NG ME	THOD						DRILI	- RI	G.	•	.50.0	•									,	IAMETER	-
			, ROTAF		-151.5')					150		N=/  14.5.5	4ED :-								.875		IOIENOV ==:	_
SAMPLI SPT(			AND SIZE(	(S) (ID)								E/HAMN Ibs, 30			ор						AMME 88%	REFF	ICIENCY, ERI	
BOREH	IOLE E	ACKF	ILL AND CO	OMPLET	ION						ER	DURING	G DRII	LINC	3 A	AFTER			(DATE	) TO	OTAL		OF BORING	-
Piezo	mete	r						READ	OING	iS		Not Re	ecorde	d		N	ot Rec	orded		_   1	51.5	ft		-
Elevation (ft)	Ö Depth (ft)	Material Graphics			Descr				Sample Location		Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	3
	; ************************************			ILT (ML) n SAND;	; hard; gra weak cen	ayish brownentation			)   	S17	81.5	9-12-19	31	18	18	85.1 56		27	4			000000000000000000000000000000000000000		
05.54	85		medium; li	ittle SILT ILT (ML)	; weak ce ; hard; bro	ementatio own; wet;	own; wet; fin n some fine to			S18	85 86.5	14-20-25	45	18	15	17.7						000000000000000000000000000000000000000		
00.54	90		SILTY SA fine to coa				sh brown; w entation.	 et;		S19	90	37-50	50/ 5.5"	12	12	36.2								
95.54 90.54 <b>-</b> 1	95			ers; wet;	some fine	e to coars	wn with redo e SAND; me		X	S20	95 96.5	34-50	50/3"	9	9	59.3						000000000000000000000000000000000000000		
JU.J-1=1	JU			(cont	inued)																			
											В	EPORT ORIN	Ģ RE	ECC				1.				S	DLE ID 0017R	
											D	IST.	COL	JNTY	•	RO	UTE	F	POSTN	/IILE		EA		
9		.Al	IFOI peed Re	KIMI	Α	7	JRS   HMM   A	RUP				ROJECT Californ					rain					,		
			and D	*I A		7	_	1211	шир		'	amull	ոսՈ	ıyı I-	しわら	Juli	ıaılı							

Cali	ECT NA <b>forni</b> ED BY	a Higl	h-Speed Train BEGIN DATE	Fresno 1	to Bakerst	field ATE BO	RFHO	DIFI	OCA	TION (La	at/Lond	n or N	Jorth/	Fast a	ınd Da	tum)		_   1		CT NUN <b>77-00</b> D		_
A. P	oling		Oct-25-11		ct-27-11	N	2136	3102	2.464	F / E634								3	S00 <sup>-</sup>	17R		
		ONTRA	CTOR/DRILLER				SITU			zomoto	r										VATION NAVD88)	
		THOD					iano ILL R		piez	zomete										,	NAVD88) IAMETER	_
			, ROTARY(6.5'-	-151.5')		F	ailing	g 150											4.875			
			AND SIZE(S) (ID)							PE/HAMN D lbs, 3			on						AMME 68%	REFF	ICIENCY, ERI	
	(1-3/8 HOLE		ILL AND COMPLET	TION						DURING			-	AFTER	RDRIL	LING	(DATE	- 1		DEPTH	OF BORING	_
Piez	omet	er					ADIN			Not Re					ot Rec		`		151.5	ft		_
															(%)		(%		st)			
Elevation (ft)	Depth (ft)	Material Graphics		Descrip	otion		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	6
	100		CLAYEY SAND (S fine to medium; we			brown; wet;		S21		38-50	50/6"	12		43.1								
85.54	105		SANDY SILT (ML) brown mottling; we					S22	105	17-23-27	50	18	17	1								
80.54	110						<u> </u>	V	106.5													
			Poorly graded SAN trace fines; weak o			wet; mediun	1;	S23	111.5	19-14-20	34	18	17									
70.54			SILTY SAND (SM) little SILT; weak ce 116' Grades fine.			e to medium	);	S24	115	12-24-25	49	18	16	26.4						<u> </u>		
ı ∪.54 <b>=</b>	120		(cont	inued)																		
										REPORT BORIN			RD								DLE ID 0017R	_
										IST.		JNTY			UTE	F	POSTN	<b>MILE</b>		EA		
	<b>(</b>		LIFORNI. Speed Rail Aut	Α	LIRS	HMM ARUP	-			ROJECT												-
		ligh-9	speed Rail Au	thority	CALE	TORNA HGH-SPE	D TRAP			Califorr RIDGE N				ed T		v			DA		CULLET	_
	•		Poor Ruii Au							NINGE I	MOINIRI	Ľĸ					ırran		) DA	1E 20-12	SHEET 6 of 8	ł

Califor	NAME nia Hig	h-Speed Train Fresno to Bakersfield	<u> </u>	FUO		004	TION (I.e.	<b>1</b> /1	N	th- //	F4 -	D	4		_   1	1315	77-00	MBER
LOGGED I A. Polin		BEGIN DATE COMPLETION DATE Oct-25-11 Oct-27-11					TION (La 1 / E634									900,		
DRILLING	CONTRA	CTOR/DRILLER	IN-S	ITU T	EST	ING									SI	JRFA	CE ELE	EVATION
Pitcher/ DRILLING		- <del> </del>		andp L RIC		piez	zometer	•										NAVD88) IAMETER
		, ), ROTARY(6.5'-151.5')		iling		00										1.875		IAIVIETER
		AND SIZE(S) (ID)					PE/HAMN										R EFF	ICIENCY, ERI
SPT(1-		ILL AND COMPLETION					DURING				FTFR	DRII	LING	(DATE		38% OTAL	DEPTH	OF BORING
Piezom				DING			Not Re					ot Rec				51.5		
Elevation (ft)	Material Graphics	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests
-120*		CLAY with SAND (CL); hard; brown; wet; few fin SAND; trace medium SAND; medium plasticity; cementation.		X		121.5	17-50	50/ 6"	12	12	76.4		27	10			000000000000000000000000000000000000	
125-		Poorly graded SAND (SP); dense; brown; wet; i medium; trace fines; weak cementation. 125.4' Grades to grayish brown.	fine to			125 126.5	16-22-23	45	18	10								
160.54 130• •		130' Grades medium.		X		130 131.5	20-20-27	47	18	9								
155.54 135•		135' Grades very dense; fine. 135.5' Grades to medium.		X		135 136.5	25-30-38	68	18	9							000000000000000000000000000000000000000	
150.54 <b>-</b> 140•		(continued)																
					-	R	EPORT BORING	TITLE G RF	 CO	RD								DLE ID 0017R
							IST.	_	JNTY			UTE	F	POSTN	MILE		EA	
	CAI	IFORNIA LIRS HMM	ARUP			P	ROJECT	ORE	RIDO	E N	AME	_						
	<b>U</b> , (1	Speed Rail Authority	2 m 1 m			10	Californ	ia H	iah_	Sno	od T	roin						

	ECT NA		h-Speed Train	Fresno te	n Rakersfield															T NUI		
LOGO	ED BY	ııııg	BEGIN DATE	COM	IPLETION DATE	BORE	HO	LE L	OCA	TION (La	t/Long	or N	orth/	East a	nd Da	itum)		H	OLE I	)	<u>'</u>	
	Poling	NTRA	Oct-25-11	Oc	t-27-11	IN-SI				1 / E634	0038	3.382	2 (N	latior	nal G	ria)				17R	EVATION	
	her/W									zometer											NAVD88)	
	ING ME			454.51)		DRILL			20												IAMETER	
			), ROTARY(6.5'- AND SIZE(S) (ID)	-151.5')		Fail				PE/HAMN	MED ID	`							1.875		ICIENCY, ERI	
	Γ(1-3/8		AND SIZE(S) (ID)			1				0 lbs, 30			ор						38%	.1 \ L1 1	IOILINOT, LIN	
			FILL AND COMPLET	ION		GROU READ			TER	DURING			) <i>F</i>	FTER			•	′			H OF BORING	
Piez	zomete	er				INLAL	IIVC			Not Re	corde	1		N		corded			51.5 	ft 		$\overline{}$
		S					Ē	L.	Œ.						Moisture Content (%)		(%)		Shear Strength (tsf)			
Œ		raphi					catio	nmbe	bth	6 in.	£	Ē.	í.	(%)	onte	t (%)	ydex	(%	ngth	thod		
tion (	(#)	al G					le Lo	e R	e De	ber	q) ər	ration	ery (	/ash	Ire C	Ë	ity	ics (	Stre	g Me		
Elevation (ft)	Depth (ft)	Material Graphics		Descript	ion		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	loistu	Liquid Limit (%)	Plasticity Index	Organics (%)	hear	Drilling Method Casing Depth	Remarks/ Other Tests	
<u> </u>	140	<u>≥</u> 	SILT with SAND (N	ML); hard; br	own; wet; little fine		S	တ S29			33	18	18		2			0	S		Other rests	+
			medium SAND; mediu				1)							70.9		40	14					E
			medium; trace fine			ile to	$\wedge$		141.5													E
	=																					F
																						E
																				<u>0000000000000000000000000000000000000</u>		
	=					. – – -	_															F
145.54	145		Poorly graded SAN wet; fine to mediur	n; few SILT;	(SP-SM); dense; weak cementatio	brown; n.																E
145.54	145		144.5', grades to c SILT with SAND (N	- $  -$			1	S30	145	14-18-23	41	18	12	70.0								E
	=		medium SAND; we	eak cementa	ation.	. 10	$\wedge$	,	146.5	5				73.3								F
																						E
																						E
	=																					E
	=																					E
																						E
140.54	150		SANDY SILT (ML)	 ; hard; gravi	 sh brown with bro	 wn	-	S31	150	13-27-25	52	18	18									F
			mottling; wet; some	e fine SAND	; weak cementation	on.	ΙX							58.9								E
							/\	\	151.5					30.3								_
			Borehole terminate	ed at a depth	n of 151.5' on																	F
7			For corrosion test	raculte caa	Annendiy F																	
7/2/2					• •	mnlaa																E
135.54 135.54	=		Soil moisture indic	g retrieval th	rough rotary meth	od <sup>.</sup>																F
135 54	155		drilling fluid. Soil nused as an indicati	ion of a pote																		E
130.54	=		free groundwater t		9 . 1																	F
3	=		See Borehole Log and key to test dat			mart																
ל הלילות היים	=																					Ė
2	=																					
2 2 2	=																					E
XO.	_=																					Ė
	=																					F
130.54	160																					
-130.54									F	REPORT T	TITLE									НС	DLE ID	
3									E	BORING	Ģ RE	CO				1-	OOT*	411 F		S	0017R	
			UEO D\ ''		Λ					DIST.		JNTY			UTE		POSTN	VIILE		EA	<b>.</b>	
			LIFORNI		URS HMM	ARUP				PROJECT Californ					rain							
ŭ (7	Н	igh-	Speed Rail Au	thority	CALFORNA H	GH-SPEED T	RAN			BRIDGE N			PF	REPAF	RED B				DA		SHEET	
≟ــــــ													<u> </u> D	. Ma	ggi/`	ı. Cu	ırran		2-2	20-12	2   8 of 8	

Calif	CT NA	a Hig	h-Speed Train Fre	sno to Bakersfield	1,											1	3157	77-00	MBER )	_
OGGE A. Pa	ED BY oling		BEGIN DATE Oct-27-11	COMPLETION DATE Oct-28-11	BORE N21	HOLE   3442	LOCA 8.022	TION (La 2 / E634	t/Long 10369	or N 9.116	lorth/l 6 (N	≣ast a latior	nd Da nal G	tum) rid)			OLE 10			
RILLII	NG CC		CTOR/DRILLER		IN-SI	TU TES	TING				- (			- /		SL	JRFAC	E EL	EVATION	_
	er/W						e piez	zomete	r							_		٠,	NAVD88)	_
	NG ME ER(0		, ROTARY(6.5'-165	5')	DRILL Fail	. RIG ing 15	500										)REH( 1.875		DIAMETER	
SAMPL	ER TY	PE(S)	AND SIZE(S) (ID)	,	SPT I	HAMME	R TY	PE/HAMN								H/	AMME		FICIENCY, ERI	-
	(1-3/8		ILL AND COMPLETION					DURING			•	CTCC	וחחוו	LING	/DATE		58%	) CDT	H OF BORING	_
	ceme				READ		VI LIV	Not Re			, ,		ot Rec		(DATE		65 ft		TO BOKING	
					•								(%)				f)			
		Material Graphics				tion	Sample Depth (ft)	<u> </u>	<u></u>	<u>:</u>		(9	Moisture Content (%)	(%	Plasticity Index (%)		Shear Strength (tsf)	ا ھ		
on (ft	Œ	Gra				Loca	Dep	er 6	(bl/f	tion (	ry (in	%) ys	Š	imit (	y Ind	%) s	trenç	Meth		
Elevation (ft)	Depth (ft)	terial				Sample Location Sample Number	uple	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	isture	Liquid Limit (%)	sticit	Organics (%)	ear S	Drilling Method Casing Depth	Remarks/	
<u> </u>	O De	Ma		Description				B	ź	_		200	ě	Liq	Pla	ő	She	C D I	Other Tests	3
	3		ASPHALT (8") (AC).			S0 (0,0)	1 0			60	60									
	Ξ		medium; trace fines; su	wn; moist to dry; fine to bangular GRAVEL; weal	k	200														
	$\exists$		cementation; [FILL].			00000														
	∄	$\mathbb{H}$				202						40.1						$ \mathcal{M} $	Modified Proctor	
						707												}	Max γ <sub>d</sub> = 127.4 pcf Optimum W <sub>i</sub> =	ļ
	∃					202												}	8.6%	
00.75	_ =					0.0	5											}  •		
00.75	5		SANDY SILTY CLAY (or aravish brown mottling:	CL-ML); hard; brown with some fine SAND; low place.	n asticitv:	√ S0	2 5	12-15-16	31	18	18							$  \cdot  $		
	<u></u>		weak cementation; [AL	LUVIUM].	actionly,	$\mathbb{N}$	6.5					54.8	10.1					$  \cdot  $		
	∄																		Mud rotary set u at 6.5'; 4.875"	u
	Ξ																		drag bit	
	=																			
	Ξ																			
	Ξ																			
95.75	10		SILTY SAND (SM); der	nse; grayish brown interb	edded	\/ S0	3 10	16-23-22	45	18	14									
	Ξ		with reddish brown; sor	me SILT; trace fine GRA	VEL.	M	11.5					43.5	14.4							
	$\exists$						11.0													
	Ξ																			
	=																			
	=																			
	$\exists$																			
90.75	15-					// 50	4 15	19-20-17	37	18	15									
	∄								-			48.8	11.8							
	$\exists$					H	16.5													
	╡																	000000000000000000000000000000000000000		
	∄																			
	$\exists$																			
	=																			
85.75	20																	<u>e</u>		
			(continue	d)																
								REPORT BORIN			חשו								OLE ID 0018R	4
								DIST.		JNTY		RO	UTE	F	POSTN	/ILE		E/		
<u></u>	<b>(</b>	Δ	<b>IFORNIA</b>	URS HMM	ARUP			PROJECT										$\perp$		_
	П	iah-	Speed Rail Author	rily Trai empara i	HON Spring	RAN	(	Californ	nia H	igh-	Spe	ed T		.,			15:-		6::===	_
	- 11	911-3	pecu kuli Aulilo	The state of the s	or that			BRIDGE N	NUMBI	≞K			RED B ggi/T		ırran		DA1	ге 20-1:	SHEET 2 1 of 9	_

Cal	ECT NA		h-Speed Train Fres	sno to Bakersfie	ld														77-00		
LOGG	SED BY Poling		BEGIN DATE Oct-27-11	COMPLETION DAT	E BORE				TION (La 2 / E634									OLE II	18R		
DRILL	ING CO		ACTOR/DRILLER		IN-SIT	TU 1	TEST	ING							-,		SI	JRFA	CE ELI	EVATION	
	her/W				DRILL		•	piez	zometer	r									•	NAVD88) DIAMETER	
			), ROTARY(6.5'-165	')	Fail												_	1.875			
	/LER 1\ Γ(1-3/8		) AND SIZE(S) (ID)						PE/HAMM D lbs, 30			р						амме 38%	:R EFF	FICIENCY, ERI	
BORE		BACK	FILL AND COMPLETION		GROU READ			TER	DURING Not Re			6 A		DRIL ot Rec		(DATE	<i>'</i>			H OF BORING	
INEA	it cem	ent g	Tout						NOT RE	cordec					oraea			165 ft			Т
Elevation (ft)	ک Depth (ft)	Material Graphics	D	escription		Sample Location		Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	20 =		20.0', grades medium d	ense; brown.		X	S05	20	4-6-9	15	18	12	38	13.1							E
280.75			SILTY CLAY with SANI interbedded with grayis mottling; wet; little SANI	n brown with reddish b	- — — — – rown		/ S06	25 26.5	8-13-18	31	18	14	76.9	24.9	22	4			3000000000000000000000000000000000000		
275.75	30-		SILTY SAND (SM); med fine to medium; some S	dium dense; reddish bi ILT.	rown; wet;	X	S07	30 31.5	10-12-13	25	18	14	25.3						1 - I		
270.75	35		Poorly graded SAND wi		dense;		S08	35	26-27-27	54	18	15							<u> </u>		
270.75	40		35.6', grades to grayish		1.		V	36.5					13.4						000000000000000000000000000000000000000		
			(continue	d)															-		
203.73		CA igh-	LIFORNIA Speed Rail Author	URS HM	M ARUP	RAN		E F	REPORT BORING BIST. PROJECT Californ	G RE COL OR B nia Hi	RIDG gh-	SE N	AME ed T			POSTN	/ILE	5,	S EA		
20.	-	9"	opoca Kali Adillol	,					RIDGE N	NOMBE	ĸ			RED B ggi/1		ırran		DA 2-	1E 20-12	SHEET 2 of 9	

Califor	NAME	gh-Speed Train Fresno to Bakersfiel	d	-1101 -	1004	TION // -	4/1	N	l4l- //	F4 -	D-	t\		_ 1	31577		BER
LOGGED  A. Polir		BEGIN DATE COMPLETION DATE Oct-27-11 Oct-28-11				TION (La 2 / E634									OLE ID 30018	3R	
		ACTOR/DRILLER	111 - 111	TU TES										SI	JRFACE	ELE	
Pitcher.			Sta		e pie:	zomete	r									•	AVD88)
		'), ROTARY(6.5'-165')		ing 1	500									- 1	1.875 in		AIVIETER
		S) AND SIZE(S) (ID)	- 1			PE/HAMN								H	AMMER I		CIENCY, ERI
SPT(1-		FILL AND COMPLETION	- 1			0 lbs, 30			•	FTFF	DRII	ING	(DATE	- 1	38% STAL DE	PTH	OF BORING
Neat ce				DINGS		Not Re					ot Rec		(5) (1)		65 ft		01 2014110
											(%)		(9)		st)		
Elevation (ft)	Material Graphics	Description		Sample Location	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf) Drilling Method	Casing Depth	Remarks/ Other Tests
40	<u> </u>	Description 40.0', grades medium dense; few SILT.		\ / S0		8-12-13	25	18	13	Ñ	2			0	<del></del>	++	Other rests
260.75 45		45.0', grades very dense.		X S1	41.5 0 45 46.5	18-34-47	81	18	10	9.5	18.1						
255.75 50		SANDY SILT (ML); dense; grayish brown; wet; SAND; weak cementation.  Poorly graded SAND (SP); dense; grayish brow fine to medium; trace SILT; weak cementation.	 wn; wet;	S1	1 50 51.5		35	18	13	83.1						ગ્રી	
250.75 55		Poorly graded SAND with SILT (SP-SM); densing grayish brown; wet; fine to medium; few SILT; cementation.		S1	2 55 56.5		37	18	8	11.1							
245.75 <b>—</b> 60•		(continued)															
						REPORT											LE ID
						BORIN DIST.		<u>-CO</u> JNTY			UTE	F	POSTN	/ILE		S0 EA	018R
	$C\Lambda$	LIEODNIIA URS HMM	1 ARLIP														
	CA					PROJECT Californ					rain						
	High-	Speed Rail Authority	Alma Carren S			BRIDGE N			- 1	•							

PROJI			h-Speed Train Fresno to Bakersfield															T NUI		
LOGG	ED BY	a mg	BEGIN DATE COMPLETION DATE					TION (La								Н	OLE II	)		
	oling	ONTRA	Oct-27-11 Oct-28-11 ACTOR/DRILLER	INZ I				2 / E63 <sup>4</sup>	+0308	). I I	יו) כ	ialioi	nai G	na)		1 -		18R CE ELI	EVATION	-
	her/W					-	piez	zomete	r									•	NAVD88)	
DRILL			D '), ROTARY(6.5'-165')	DRILL Faili			00										OREH 1.875		IAMETER	
SAMP	LER T	YPE(S	) AND SIZE(S) (ID)	SPT H	ΑM	IMEF	R TYI	PE/HAMN								H	AMME		ICIENCY, ERI	
	(1-3/8		FILL AND COMPLETION					0 lbs, 3			-	FTFF	R DRII	LING	(DATE		S8%	DEPTI	H OF BORING	
	t cem			READI					ecorde				ot Rec		`	′	65 f			Ц
		SS			_	_	<b>₽</b>						Moisture Content (%)		(%)		(tsf)			
(#)		Material Graphics			Sample Location	Sample Number	Depth (ft)	6 in.	J/ft)	Penetration (in)	(in)	(%)	Conte	Liquid Limit (%)	Plasticity Index (%)	(%)	Shear Strength (tsf)	Drilling Method Casing Depth		
Elevation (ft)	Depth (ft)	rial G			ole Lc	ole N	Je De	Blows per 6 in.	N-Value (bl/ft)	tratio	Recovery (in)	200 Wash (%)	ure	Lim	icity I	Organics (%)	r Stre	ng Me		
Elev	Dept	Mate	Description		Sam	Samp	Sample	Blows	N-Va	Pene	Reco	200 \	Moist	Liquik	Plasti	Orga	Shea	Drillir	Remarks/ Other Tests	
	<b>-</b> 60		SILTY SAND (SM); very dense; reddish brown; we fine; some SILT; weak cementation.	et;	X	S13	60	29-50	50/ 5.5"	12	9	39	15.1					$\sim$		
	=		line, some oil i, weak cementation.		П		61.5					39	13.1					000		H
																		000000000000000000000000000000000000000		
	Ξ																	000		E
	=																	)))()		Ħ
	Ξ																	))()()		
	Ξ																	<u> </u>		
240.75	65—		Poorly graded SAND with SILT (SP-SM); very den		M	S14	65	15-22-50	72/ 11.5"	18	8							000		E
	Ξ		grayish brown; wet; fine to medium; few SILT; wea cementation.	ak	Н		66.5		11.5			11.1	12.4					000		E
	Ξ						00.5											000		
	Ξ																	000		Ħ
	_																	000		
	Ξ																	000		
																		000		Ħ
235.75	70		SILTY SAND (SM); very dense; reddish brown; we		$\mathbf{H}$	S15	70	20-22-34	56	18	14							000		
	Ξ		fine; little SILT; weak cementation.	.,	X							22.2	12.9					)))))		
	Ξ				Н		71.5													
																		))))(		Ħ
2	Ξ																	))()()		
717	Ξ																	)))))		
5	=																	))()()		H
230.75	75—																	000		Ħ
	Ξ		75.0', grades dense; brown; fine; some SILT.		M	S16	75	13-17-21	38	18	17	32.9	13.5					000		
3	Ξ				Δ		76.5											<u> </u>		
	Ξ																	000		
	Ξ																	000		
	Ξ																	000		Ħ
K)	$\equiv$																	000		
230.75					$\rfloor   $								L		L			000		
-225.75 - 2	-oU		(continued)																	
5								REPORT			חם								DLE ID 0018R	一
i								BORIN DIST.	_	JNTY		RO	UTE	F	POSTN	ЛILE		EA		$\dashv$
	<b>(</b>	Δ	LIFORNIA JURSIHMMIA	RUP			F	PROJECT	ORP	RIDG	SE N	AMF								$\dashv$
	L	رر انماہ	Speed Rail Authority	4-SPEED TR	IAN		(	Californ	nia H	igh-	Spe	ed T		<u> </u>			D.4	TE	CULLET	
20.		יישיי	opera itali Adillolliy					BRIDGE I	NOMBE	=K			RED B I <b>ggi/</b> ]		ırran		DA 2-	1E 20-12	SHEET 4 of 9	

Cali	CT NA		h-Speed Train Fre	esno to Bakersfield													1	3157	77-00		
LOGG A. P	ED BY oling		BEGIN DATE Oct-27-11	COMPLETION DATE Oct-28-11					TION (La 2 / E634									OLE 10	18R		
	ING CC		ACTOR/DRILLER		IN-SIT				zomotor								- 1			EVATION NAVD88)	
	ING ME				DRILL		-	piez	zometer										,	IAMETER	
			'), ROTARY(6.5'-16	55')	Fail													.875			
	LER TY (1-3/8		) AND SIZE(S) (ID)						PE/HAMIV D lbs, 30			р						AMME 88%	REFF	ICIENCY, ERI	
BORE	HOLE E	BACK	FILL AND COMPLETION	N	GROU READ			ΓER	DURING			; A		DRIL		DATE	′			H OF BORING	
Nea	t ceme	ent g	rout		READ	ING			Not Re	cordec			N	ot Rec	orded		1	65 ft			$\top$
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	-80			with SILT (SP-SM); dense; edium; few SILT; weak		M	S17	80	18-22-25	47	18	14									E
220.75	85		cementation.		· —			81.5					9.4	16.7					000000000000000000000000000000000000000		
			SANDY SILT (ML); ha SAND; weak cementa	ırd; grayish brown; wet; son tion.	ne fine		S18	85.86.5	21-34-35	69	18	16	53.3	20.4					000000000000000000000000000000000000000		
215.75	90		SAND; weak cementa			/ M	S19	90	19-27-37	64	18	14	84.9	30.2					00000000		
			SANDY SILT (ML); ha mottling; wet; some fir	ırd; brown with reddish brov ne SAND; weak cementatio	vn n.			91.5					69.5	27.1							
210.75 -205.75	95		SILTY SAND (SM); ve medium; little SILT.	ory dense; brown; wet; fine	to		S20	95 96.5	24-31-43	74	18	12	23.8	13.5					000000000000000000000000000000000000000		
200.10	.00		(continu	ed)																	
6	<b>(</b>	A	LIFORNIA	URS   HMM	ARUP			D P	REPORT BORING	G RE	RIDO	SE N	AME	UTE	P	POSTM	/ILE		HC SI EA	DLE ID 0018R	
	H	igh-	Speed Rail Autho	ority California Ho	H-SPEED T	RAN			Californ	ia Hi	gh-	Spe	ed T	rain RED B	Y			DA	TE	SHEET	
		•		•							•			ggi/T		rran		2-2	20-12	2 5 of 9	



Pitcher/W DRILLING MI AUGER(C SAMPLER TO SPT(1-3/8	ETHOD D'-6.5'), ROTARY(6.5'-16 YPE(S) AND SIZE(S) (ID) 8") BACKFILL AND COMPLETIO tent grout  Sich as being a size of the size	N Description	DRILL F Failin SPT HA Autor GROUN READIN	Sample Location Sample Number	e piez 600 R TYF c, 140 ATER	PE/HAMN O lbs, 30 DURING Not Re	IER ID )-inch	LING	AFTE	Moisture Content (%)	corded		3 BC 4 HA 6 TC	305.75 ft OREHOLE 4.875 in AMMER EF 68% OTAL DEP	LEVATION (NAVD88) DIAMETER FICIENCY, ERI TH OF BORING
SAMPLER T' SPT(1-3/8 BOREHOLE Neat cem  Openty (t)  100  100  100  100  100  100  100  1	YPE(S) AND SIZE(S) (ID) 8") BACKFILL AND COMPLETIO ent grout  Silication  Silication  100.0', grades trace of	N Description	SPT HA Autor GROUN READIN	Sample Location Sample Number Sample Number	R TYF C, 140 ATER	DURING Not Re	D-inch DRIL cordec	LING	AFTE	Not Rec	corded		H/ 6 E) TC	AMMER EF 68% OTAL DEP 165 ft	TH OF BORING
Elevation (ft)	Material Graphics 100.0', grades trace of			Sample Location Sample Number	ample Depth (ft)			(L				(%) xəpı		(tsf)	Inda
100	100.0', grades trace of				ample Depth (ft)	ws per 6 in.	ne (bl/ft)	ation (in)	rry (IIn) Sh (%)	Content (%	it (%)	(%) xəpı	(%	ength (tsf)	LING B
100		rganic material.	4	1001					Kecovery (in) 200 Wash (%)	Moisture	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf) Drilling Method	Remarks/ Other Tests
				S21	1 100	36-50	50/ 5"	11 1	27.8	3 16.9			2.1		
200.75 105		ome SILT.	2	S222	2 105	22-25-32	57	18 1	37						
195.75 110	110.0', grades to gray	ish brown.	, v	S23	3 110 111.5	43-37-50	87/ 10.5"	17 1	38.7	17					
190.75 115			8	S24	1 115 116.5	21-27-27	54	18	7						
185.75-120-	(continu	red)													
	(continu	/			E	REPORT BORING DIST.				OUTE	P	POSTM	/ILE		HOLE ID S0018R EA
	CALIFORNIA High-Speed Rail Author	URS HI	MM   ARUP	•		PROJECT Californ BRIDGE N	ia Hi	gh-S <sub>l</sub>	peed	Train RED B				DATE	SHEET

Cal	ECT NA		h-Speed Train Fresno to Bakersfield															77-00		
LOGG	SED BY Poling	•	BEGIN DATE COMPLETION DATE Oct-27-11 Oct-28-11					TION (La 2 / E634									OLE 10	18R		
DRILL	ING CC		ACTOR/DRILLER	IN-SIT	U T	EST	ING							-,		SI	JRFA	CE ELI	EVATION	
	her/W ING ME			DRILL		•	piez	cometer	r									•	NAVD88)	
	-		'), ROTARY(6.5'-165')	Faili													1.875			
	/LER ΤΥ Γ(1-3/8		) AND SIZE(S) (ID)					PE/HAMM Dibs, 30			р						амме 38%	:R EFF	ICIENCY, ERI	
BORE	HOLE	, BACK	FILL AND COMPLETION	GROU			ER	DURING			; A		DRIL ot Rec		(DATE	′ I			H OF BORING	
inea	t ceme	ent g	rout	TKE/KBI				Not Re	coraec	1		N.		oraea		1	65 ft	<u>:</u>		
Elevation (ft)	Depth (ft)	Material Graphics	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	120		SANDY SILT (ML); hard; grayish brown with redd brown mottling; wet; some fine SAND; weak	lish	X	S25	120	8-16-40	56	18	10	57.4						$\sim$		E
180.75			SILTY SAND (SM); very dense; grayish brown; w medium; few SILT; weak cementation.	 et;	X	S26	121.5 125 126.5	23-30-42	72	18	9	16.6						<u> </u>		
	130		130' Grades fine. 130.2' Grades fine to medium.		X		130 131.5	21-30-40	70	18	11	23.8	21.5							
170.75 17			SANDY SILT (ML); hard; grayish brown; wet; som to medium SAND; weak cementation.	ne fine	X	S28	135 136.5	35-50	50/4"	10	10	61.3	19.9					000000000000000000000000000000000000000		
2			(continued)																	
	Э	CA igh-	LIFORNIA Speed Rail Authority	ARUP H-SPEED TH	IAN		P	REPORT TO SORING	G RE COL OR B nia Hi	RIDG gh-	SE N/ Spe	AME ed T	UTE rain RED B	Y	POSTN	/ILE	DA 2-	S EA	SHEET	

Calif	CT NA	a Hig	h-Speed Train Fresno to Bakersfield													_   1	1315	T NUI <b>77-00</b>	
OGGE A. Po			BEGIN DATE COMPLETION DATE Oct-27-11 Oct-28-11					TION (La 2 / E634									OLE 11	⊃ 18R	
DRILLII	NG CC		ACTOR/DRILLER	IN-SI	ΓU	TEST	ING				- (			-,		SI	URFA	CE ELE	EVATION
Pitch			*****				piez	zomete	r										NAVD88)
			), ROTARY(6.5'-165')	DRILL Fail			00										OREH 4.875		IAME I ER
			) AND SIZE(S) (ID)	- 1				PE/HAMN								H	AMME		ICIENCY, ERI
SPT(			FILL AND COMPLETION	- 1				DURING			-	AFTFF	R DRII	LING	(DATE		68%	DEPTI	H OF BORING
Neat				READ				Not Re					ot Rec		(2,		165 ft		
													(%)		(%)		st)		
<u>.</u>		Material Graphics			Location	nber	Sample Depth (ft)	.⊑ਂ	 €	(ii)	<u></u>	(%	Moisture Content (%)	(%)	Plasticity Index (%)		Shear Strength (tsf)	면	
ion (f	(#	al Gra			9 [0	Nur	e Dep	per 6	(pl/	ation	i)	ash (	e Co	Limit	ity Inc	%) sɔ	Stren	Meth	
Elevation (ft)	Depth (ft)	ateria			Sample	Sample Number	ample	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	oistur	Liquid Limit (%)	astici	Organics (%)	ear (	Drilling Method Casing Depth	Remarks/
<u>ш</u>	140	Σ	Description  SILTY SAND (SM); dense; brown; wet; fine to m	edium;	\ \		ගි 140			18	16	78	Σ	<u> </u>		ō	ळ	<del>/ -    </del>	Other Tests
			some SILT; weak cementation.		_]X		141.5					42.1	1					000	
			SILT (ML); hard; grayish brown; wet; few SAND; cementation.	weak		)	141.5					85.1						2000	
																		000000000000000000000000000000000000000	
	_																		
																		000	
60.75	145		SILTY SAND (SM); dense; grayish brown; wet; fi	- — — - ine:	-	S30	145	14-20-24	44	18	12	-						000	
	₫		some SILT; weak cementation.	,	X	<u> </u>						49.3	22.1					000	
	$\exists$						146.5											000	
																		2000	
	₫																	2000	
																		) (1)	
	∃																	000	
55.75	150		150.0', grades fine to medium-fine; little SILT.			S31	150	20-25-28	53	18	12	-						000	Drilling stops at
	=		130.0, grades line to mediam-line, little GLT.		X							17.1	23.9					000	165'; 15' pocket for PS logging
							151.5												00 0
																		000	
	<u> </u>																	2000	
	∃																	2000	
	=																	2000	
50.75	155																	1000	
	=																	000	
	Ξ																	000	
	∃																	000	
	_=																	000000000000000000000000000000000000000	
	$\exists$																		
	=																		
45.75	160																	)QQ	
			(continued)																
								REPORT BORIN			RD							HC	DLE ID 0018R
								DIST.		JNTY			UTE	F	POSTN	/ILE		EA	
	<b>(</b>	CA	LIFORNIA LIRS HMM	ARUP				ROJECT											
			Speed Rail Authority	GH-SPEED T	TRAN			Califorr BRIDGE 1					rain RED B	v			DA	TC	CULET
		3.,						ייאוטטב i	MOINIR	_IX			ggi/∖		ırran		2-	20-12	SHEET 8 of 9

	ECT NA		h Spood Train Fro	esno to Bakersfield															T NUN		
LOGG	ED BY		BEGIN DATE	COMPLETION DATE	BORE	HOL	E L	OCA	TION (Lat	/Long	or No	orth/E	East ar	nd Dat	tum)		Н	OLE ID	)		
	oling	NTRA	Oct-27-11 CTOR/DRILLER	Oct-28-11	N21 IN-SIT				2 / E634	0369	.116	(N	lation	al G	rid)				18R	VATION	
	her/W				1				zometer											IAVD88)	
	ING ME			E'\	DRILL			ıΩ												AMETER	
			), ROTARY(6.5'-16 AND SIZE(S) (ID)	5)	Faili SPT H				PE/HAMM	ER ID							_	1.875 AMME		CIENCY, ERi	_
SPI	(1-3/8	3")			Auto	ma	atic,	140	) lbs, 30	-inch	dro	-					1	88%			
	HOLE t cem		ILL AND COMPLETION	I	GROU READI			ER	DURING Not Red			Α	FTER	DRILI t Rec		(DATE	′ I	OTAL 65 ft		OF BORING	
INCO	Cem	crit gr	out			П			NOUNCE	Jorded			INC	-	orded		<del> '</del>				Т
		sics				uo	ē	(#)						Moisture Content (%)		(%)		Shear Strength (tsf)			
Œ		iraph				ocati	qun	epth	.e in	bl/ft)	n (in	(ii	(%)	Sonte	nit (%	lnde	(%)	ength	ethoc		
Elevation (ft)	Depth (ft)	rial G				ole L	le N	ole D	s per	l) en	tratic	very	Vash	inre (	d Lin	icity	nics	r Str	g Me		
Elev	Dept	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moist	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shea	Drilling Method Casing Depth	Remarks/ Other Tests	
	-160 =	T		•					_										-		Ħ
																			000000000000000000000000000000000000000		
																			200		
	Ξ																				F
	=																				
																					E
	Ξ																				F
140.75	165																				ı
	165		Borehole terminated a 10/27/2011.	t a depth of 165.0' on																	
			For corrosion test resu	ılts, see Appendix E.																	
	=		Soil moisture indicated	d as "wet" because SPT sar	nples																F
	∃		became wet during ret	rieval through rotary metho ture indication should not b	ď																
			used as an indication of free groundwater table	of a potential phreatic surfa	ce or																E
	=		· ·	 lend for soil classification ch	nart																Ħ
135.75	170		and key to test data ar		iait																Е
155.75																					
	=																				F
	<u> </u>																				
21																					
20/12	=																				F
LB 2	<u> </u>																				
RY.G	=																				
130.75	175																				F
JTRL																					
A D	Ξ																				
J ARI																					
3.GP,																					
교 교																					
CHS																					
മ ⊔് ∎125.75	180																				上
ESE ESE ESE ESE ESE ESE ESE ESE ESE ESE																					
96-0						_			REPORT 1		CO	RD								LE ID 0018R	
ELC									IST.	COU			ROL	JTE	P	OSTN	/ILE		EA		
1.0.3 BOREHOLE LOG - CHSTP F-B CHSR_F-B.GPJ ARUP DOTR LIBRARY.GLB 2/20/12 57 57 57 57 57 58 59 59 50 50 50 50 50 50 50 50 50 50 50 50 50	<b>(</b>	ΔΙ	<b>IFORNIA</b>	URS HMM A	ARUP				ROJECT												
M W			Speed Rail Autho		H-SPEED TE	RAN		(	Californ BRIDGE N	ia Hi	gh-S	Spe			~			DA	TE	SHEET	
1.0.3			Poor Kan Aomo	/					N JUGEN	OIVIBE	۸.		. Ма <u>с</u>			rran		2-2	1E 20-12	9 of 9	

	ECT NA		h-Speed Train Fre	sno to Bakersfield														ROJEC   <b>315</b> 7		MBER	
LOGG	ED BY		BEGIN DATE Oct-21-11	COMPLETION DATE Oct-21-11					TION (Lat / E6341								Н	OLE ID	)		
			CTOR/DRILLER	OCI-21-11	IN-SI				E0341	547.0	505	(INC	ationic	ai Gii	u)			SOO' JRFAC		EVATION	
	ner/W.				DDIII	DI											_		•	NAVD88)	
	ING ME SER(0'		ROTARY(5'-51.5')		DRILL Fail			00									- 1 '	3.875		DIAMETER	
			AND SIZE(S) (ID)		1				PE/HAMM D lbs, 30			n						AMME 88%	R EFF	FICIENCY, ERI	
BORE		ACKF	FILL AND COMPLETION		GRO	JND	WAT		DURING			•	FTER	DRIL	LING	(DATE			DEPT	H OF BORING	
Nea	t ceme	ent gi	rout		READ	DING	iS		Not Re	cordec			N	ot Rec	orded		5	1.5 f	t		$\neg$
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth		
	5			dium dense; light brown; r cementation; [ALLUVIUM]		50000000000	S01	0			60	60	38.3						~~~~	No asphalt	
287.53	5		SANDY SILT (ML); ver	y stiff; gray; moist; some f	 ine	    0!0!0!0!	S02	5 5 6.5	4-8-11	19	18	18	39.5	4.6						Optimum W <sub>i</sub> = 7.8%  5.0', switch to mud rotary	
			SILTY SAND (SM); me	eak to moderate cementaredium dense; brown with g ne SILT; weak cementation	ray — –	$\frac{1}{\sqrt{2}}$	S03	6.5	9-11-12	23	18	18	43.3	4.5	23	2					
			reddish brown staining; cementation. Poorly graded SAND (S	dium dense; grayish brow moist; fine; some fines; v SP); medium dense; brow trace fines; weak cementa	veak  n with		S04	8 8 9.5	2-5-7	12	18	12							<u> </u>		
282.53	10			brown with reddish brown			S05	9.5	6-6-6	12	18	15	88.1 53.7	17.9 25.6	23	3					
			staining; wet; some fine Poorly graded SAND w	f; brown with reddish brow e SAND; weak cementatio ith SILT (SP-SM); mediun lish brown staining; wet; fe	n. n — -	<b>/</b>	S06	11 12.5	4-6-6	12	18	14							$\triangleright$		
2/20/12			SILT; weak cementatio			X	S07	12.5	6-6-6	12	18	15	11.9								
GLB 3	=		Poorly graded SAND (S	SP); loose; grayish brown	 with	-\	S08	14	4-4-4	8	18	14									E
1.0.3 BOREHOLE LOG - CHSTP F-B CHSR F-B.GPJ ARUP DOTR LIBRARY GLB 2/20/12	15		dark gray seams; wet; i weak cementation.	fine to medium; trace fines	5;	X		15.5					2.8	24.1					<u> </u>		
P-B CHOR F-B.C	20																		MANARANA.		
T 2:00			(continue	-d)				,													
40LE LOG - C		· A ·		T impliant	ADI ID			E	REPORT T BORING DIST.	COU	INTY			UTE	F	POSTN	/ILE			OLE ID 0019R A	
SORE!			LIFORNIA	URS HMM	AKUP				ROJECT Californ	ia Hi	gh-	Spe	ed T								
1.0.3	Н	ign-	Speed Rail Author	CALIFORNIA HI	H-SPEED T	RAN		В	RIDGE N	IUMBE	R			RED B ggi/T		ırran		DA <sup>2</sup>	TE 20-1:	SHEET 2 1 of 3	

DRILLING OF PITCHER SAMPLER SPT(1-3	nia Hig SY Dhen CONTRA W. Bak METHOD (0'-5'), TYPE(S) 5/8")	ROTARY(5'-51.5') ) AND SIZE(S) (ID)  FILL AND COMPLETION	N21 IN-SIT DRILL Faili SPT H Auto	RIC ng IAM	513 G 150 IMEF	.18 . ING 00 R TYF	PE/HAMM O lbs, 30 DURING	547. IER ID I-inch	965 n dro	(Na	ationa	DRILLI	LING (	(DATE	11 HO S SU 22 BO 33 HA 66 SI TO TO	3157 DLE IE 3001 JRFAC 292.5 DREHG 3.875 AMME 88%	19R CE ELE 3 ft (N OLE D in R EFF		
Elevation (ft)	Material Graphics	Description		Sample Location		Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Organics (%)	Shear Strength (tsf)	Drilling Method Casing Depth	Remarks/ Other Tests	
267.53 25-		SILTY SAND (SM); medium dense; brown; wet; fil little SILT; weak cementation.	ne;		S09	21.5	14-11-9	20	18	16	22.3	12.3					<u> </u>		
262.53 30-		Poorly graded SAND with SILT (SP-SM); medium dense; grayish brown with dark gray seams; wet; trace fines; weak cementation.	fine;		S10	25.5 27	6-8-9	17	18	14	5	20.5					000000000000000000000000000000000000000		
		Poorly graded SAND with SILT (SP-SM); medium dense; grayish brown with dark gray seams; wet; medium; few SILT; weak cementation. 31.1', 2" layer; light gray; weak to medium cement			S11	30	8-10-26	36	18	15	6.3	23.4					000000000000000000000000000000000000000		
257.53 35-		SILT with SAND (ML); hard; brown with reddish by staining; wet; few fine SAND; weak cementation.  SILTY SAND (SM); dense; brown with reddish brostaining; wet; fine; some SILT; weak to moderate cementation.			S12	35 36.5	19-18-18	36	18	17	76.9						200000000000000000000000000000000000000		
-252.53-40-	<u></u>	(continued)																	
		LIFORNIA Speed Rail Authority	RUP H-SPEED TH	RAN		E F	REPORT T BORING DIST. PROJECT Californ BRIDGE N	COL OR B ia Hi	RIDG	SE N/ Spe	AME ed T	UTE rain RED B'	Y	POSTN rran	/ILE	DA <sup>2</sup> -2-2	S EA	SHEET	

9
-16
<del>-</del>
_
℃
ഗ
I
Δ.
正
℃
•
က
⋝
5
<u> </u>
=
ш
_
_
⋖
N
Ξ
ឧ
$\geq$
SS SS
;;
90

	ECT N. <b>forni</b>		h-Speed Train Fresno to Bake	ersfield														1315		IMBER <b>0</b>	
LOGGED BY BEGIN DATE COMPLETION DATE Trent Cohen Oct-21-11 Oct-21-11						BOREHOLE LOCATION (Lat/Long or North/East and Datum) N2125513.18 / E6341547.865 (National Grid)										HOLE ID S0019R					
DRILLING CONTRACTOR/DRILLER Pitcher/W. Baker						IN-SITU TESTING										SI	SURFACE ELEVATION 292.53 ft (NAVD88)				
DRILLING METHOD					RILL I												В	OREH	OLE [	DIAMETER	
AUGER(0'-5'), ROTARY(5'-51.5')  SAMPLER TYPE(S) AND SIZE(S) (ID)							1500 //ER T	YPE/HA	MMEF	R ID							_	3.875 in HAMMER EFFICIENCY, ERI			
SPT(1-3/8")						SPT HAMMER TYPE/HAMMER ID Automatic, 140 lbs, 30-inch drop										(	68% TOTAL DEPTH OF BORING				
BOREHOLE BACKFILL AND COMPLETION  Neat cement grout						OUNDWATER DURING DRILLING AFTER DRILLING (DATE) ADINGS Not Recorded Not Recorded											51.5 ft				
		SS				_	. 6	2						ıt (%)		(%)		(tsf)			
(ft)		Material Graphics				Sample Location	Sample Number	6 in.		ol/ft)	Penetration (in)	(in)	(%)	Moisture Content (%)	it (%)	Plasticity Index (%)	(%)	Shear Strength (tsf)	Drilling Method		
Elevation (ft)	Depth (ft)	ərial G				ble Lo	N eld	Blows per 6 in.		N-Value (bl/ft)	etratio	Recovery (in)	200 Wash (%)	ture C	Liquid Limit (%)	ticity I	Organics (%)	ar Stre	ng Me		
Ele	Dec	Mate	Description			San	San	Blov		> 2	Pen	Rec	200	Mois	Liqu	Plas	Org	She		Remarks/ Other Tests	_
	Ξ		SANDY SILT (ML); hard; brown with re wet; some fine SAND.	eddish staining:	;								58.5	23.2					000000000000000000000000000000000000000		
	Ξ						41	.5													
	=																		200		
	Ξ																				
247.53	45		Poorly graded SAND with SILT (SP-SM dense; grayish brown with reddish brown	//); medium wn staining; we	— — et;	V	514 4	5 11-12	-14 2	26	18	16									
	Ξ		fine; few SILT; weak cementation.	3,	ŕ	Δ	46	.5					9.3	15.7					000		
	Ξ																		000		
	=																				
242.53	50		50.0', fine to medium.			\/s	S15 5	0 14-13	-16 2	29	18	15									
	=					$\Delta$	51	.5													
	_	- 141	Borehole terminated at a depth of 51.5	' on 10/21/201	1.														احا		_
			For corrosion test results, see Appendi	x E.																	
	Ξ		Soil moisture indicated as "wet" because became wet during retrieval through ro	es																	
	Ξ		drilling fluid. Soil moisture indication shused as an indication of a potential phr	or																	
237.53	55—		free groundwater table.																		
	Ξ		See Borehole Log Legend for soil class and key to test data and sampler type.																		
	=																				
	Ξ																				
	Ξ																				
	=																				
-232.53	-60-																				_
								DEDG	T T-										1	01 5 15	
								BOR	NĢ	RE		RD			1.				S	OLE ID 30019R	
CALIEODNIIA TURS HMM ARL								DIST.	IST. COUNTY ROUTE POSTMILE							EA					
		JA	LII OKINA 🗦 🧲	HMM ARU		•		PROJE Califo	rnia	Hiç	gh-S	Spe	ed T								
	High-Speed Rail Authority							BRIDGE NUMBER PREPARED BY D. Maggi/T. Curran									DATE SHEET 2-20-12 3 of 3				



## **Appendix C Cone Penetration Test Records**

Table C-1
Summary of CPT Locations, Depths, and In Situ Testing

CPT ID	Elevation (NAVD88)	n Northing Easting Hand-Auger/Pre-Dr		Hand-Auger/Pre-Drill Depths	Measured Depth to	Total Depth	In Situ Testing		
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	SCPT <sup>[1]</sup>	PPDT <sup>[2]</sup>	
S0001CPT	2,165,095	6,316,493	296.60	0 to 5	-	80.2		✓	
S0002CPT	2,164,037	6,317,351	293.70	0 to 5; 6 to 9	-	50.0			
S0003CPT	2,162,577	6,318,313	287.50	0 to 5	-	80.2			
S0004CPT	2,162,522	6,318,980	289.20	0 to 4.5	-	80.7			
S0005CPT	2,159,881	6,321,692	292.50	0 to 5	-	80.0		✓	
S0006CPT	2,159,855	6,320,967	295.10	0 to 15	-	80.1		✓	
S0006ACPT	2,158,797	6,322,193	290.10	0 to 5	-	52.5			
S0007CPT	2,157,330	6,323,012	287.10	0 to 5	-	76.4			
S0008CPT	2,156,854	6,324,017	285.30	0 to 5.5; 29 to 36	-	100.2		✓	
S0009CPT	2,157,307	6,323,848	286.80	0 to 4.5	-	105.8	✓	✓	
S0010CPT	2,156,609	6,324,306	283.40	0 to 4	-	59.2			
S0011CPT	2,156,092	6,324,747	284.40	0 to 6	-	66.6			
S0012CPT	2,155,038	6,324,548	288.90	0 to 4.5	-	102.7	✓	✓	
S0013CPT	2,155,267	6,325,407	285.10	0 to 4.5; 9 to 11; 14 to 24	-	101.2			
S0014CPT	2,154,687	6,325,494	287.60	0 to 5	-	52.2			
S0015CPT	2,153,499	6,326,261	286.10	0 to 5	-	114.7			
S0016CPT	2,152,083	6,327,476	285.40	0 to 5	-	67.3		✓	
S0017CPT	2,151,787	6,327,731	286.30	0 to 5	-	80.4			
S0018CPT	2,150,922	6,328,346	286.00	0 to 5	-	80.4			
S0019CPT	2,150,638	6,329,493	289.10	0 to 5	-	81.5	✓		
S0020CPT	2,150,349	6,329,144	289.00	0 to 5	-	80.1			
S0021CPT	2,148,902	6,330,415	292.60	0 to 5	-	80.4			
S0022CPT	2,149,159	6,330,712	293.00	0 to 5	-	80.1		<b>~</b>	
S0023CPT	2,165,095	6,316,493	285.00	0 to 5	94.5	150.6		<b>~</b>	
S0024CPT	2,164,037	6,317,351	284.70	0 to 5	95.0	103.8	<b>~</b>	<b>~</b>	
S0025CPT	2,162,577	6,318,313	284.70	0 to 5	-	150.6		<b>~</b>	
S0026CPT	2,162,522	6,318,980	283.80	0 to 5	-	64.0			
S0027CPT	2,159,881	6,321,692	286.60	0 to 5	-	80.4			
S0028CPT	2,159,855	6,320,967	286.80	0 to 5	-	45.1			
S0029CPT	2,158,797	6,322,193	287.90	0 to 5	-	80.0		✓	
S0030CPT	2,157,330	6,323,012	288.90	0 to 5	-	64.1	✓		
S0031CPT	2,156,854	6,324,017	289.30	0 to 5.5	-	150.4		✓	
S0032CPT	2,157,307	6,323,848	290.10	0 to 4.5	-	90.7		✓	
S0033CPT	2,156,609	6,324,306	290.50	0 to 15	-	75.1	✓		
S0034CPT	2,156,092	6,324,747	297.00	0 to 5	-	84.0			
S0034ACPT	2,155,038	6,324,548	303.70	0 to 5	-	95.1	✓	✓	



Table C-1
Summary of CPT Locations, Depths, and In Situ Testing

CPT ID	Elevation (NAVD88)	Northing (NAD83)	Easting (NAD83)	Hand-Auger/Pre-Drill Depths	Measured Depth to	Total Depth	In Situ Testing		
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	SCPT <sup>[1]</sup>	PPDT <sup>[2]</sup>	
S0035CPT	2,155,267	6,325,407	289.20	0 to 5	61.0	100.2		✓	
S0036CPT	2,154,687	6,325,494	288.00	0 to 5; 13 to 22	96.0	100.2		✓	
S0037CPT	2,153,499	6,326,261	289.30	0 to 5	31.0	80.0		<b>~</b>	
S0038CPT	2,152,083	6,327,476	287.30	0 to 5	-	50.2			
S0039CPT	2,151,787	6,327,731	290.40	0 to 5	-	50.3			
S0040CPT	2,150,922	6,328,346	289.20	0 to 5	-	55.6			
S0041CPT	2,150,638	6,329,493	293.10	0 to 5	60.9	80.2		✓	
S0042CPT	2,150,349	6,329,144	291.50	0 to 5	66.0	80.0	•		

<sup>[1]</sup> SCPT: seismic cone penetration test

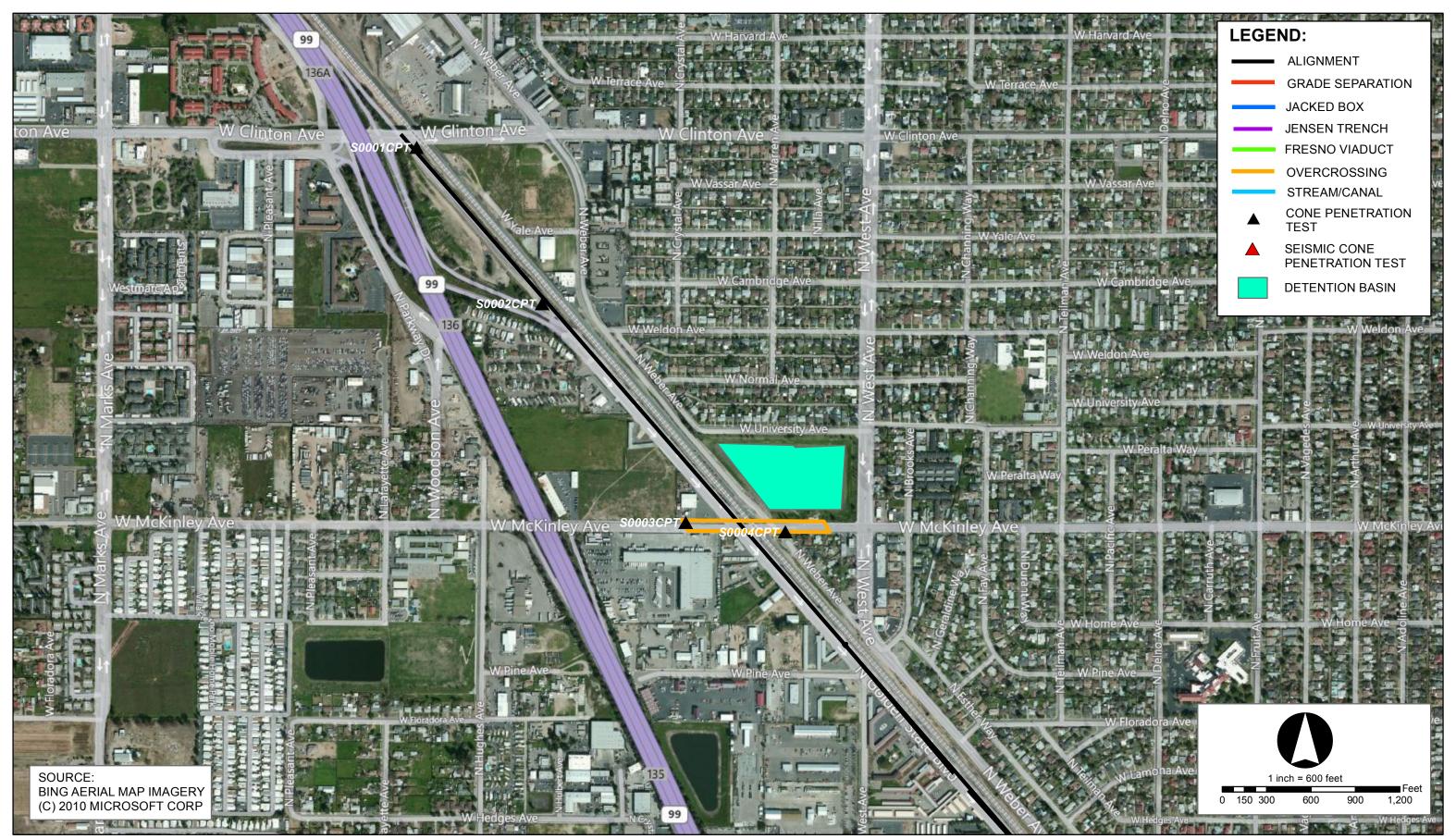
<sup>[2]</sup> PPDT: pore pressure dissipation test





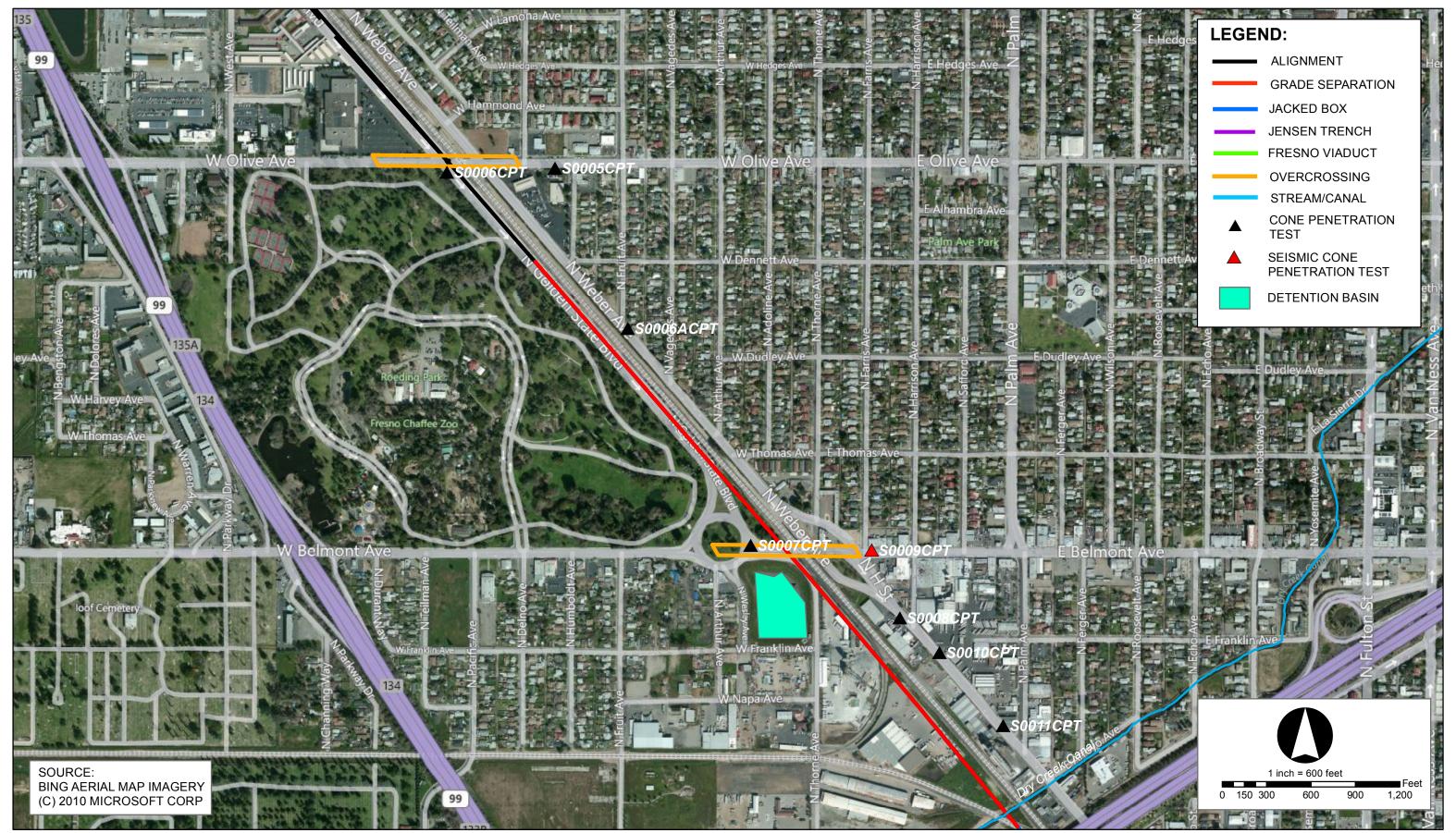


CONE PENETRATION TEST INDEX SHEET
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 1





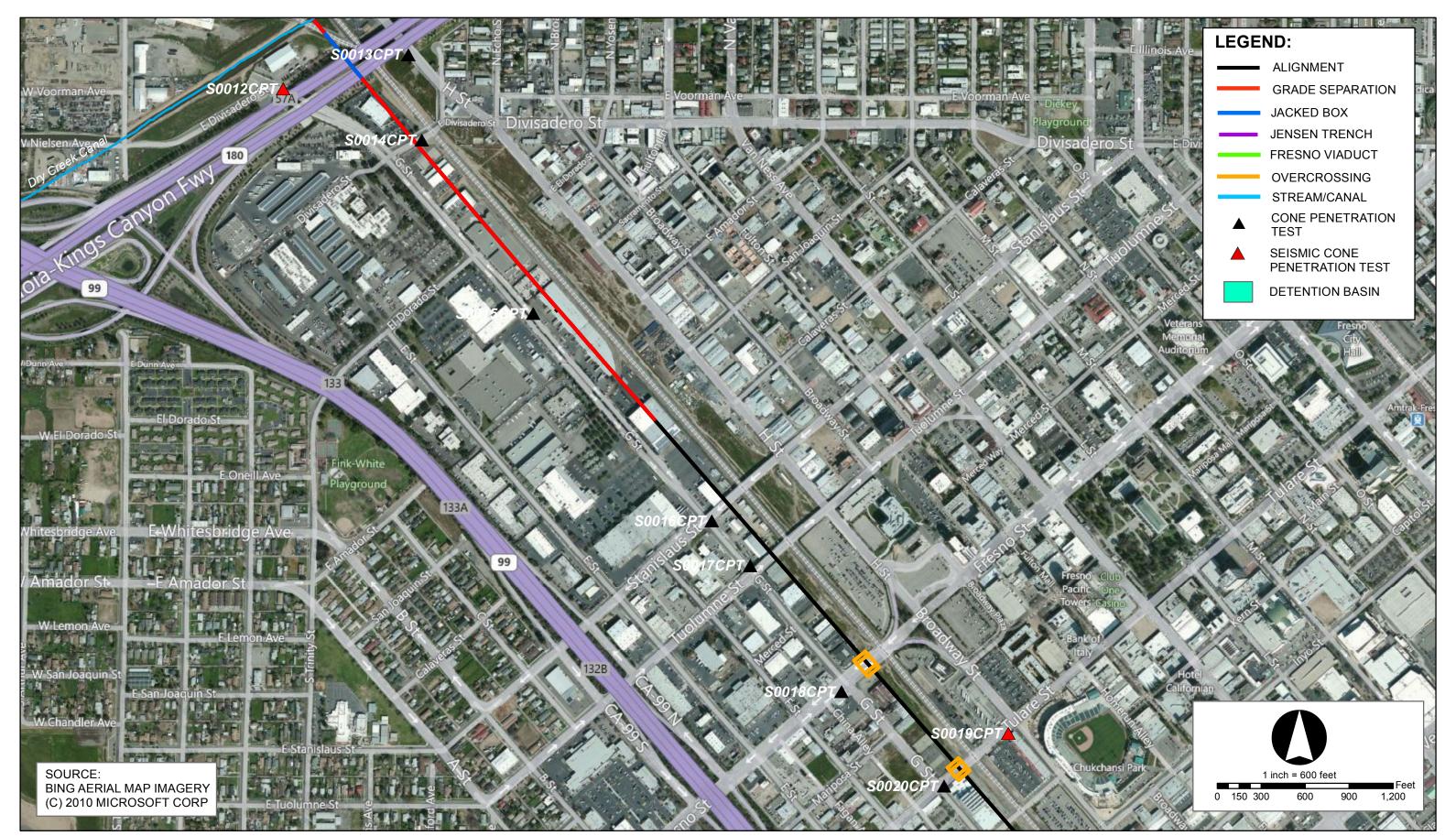








CONE PENETRATION TEST LOCATION MAP
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 1





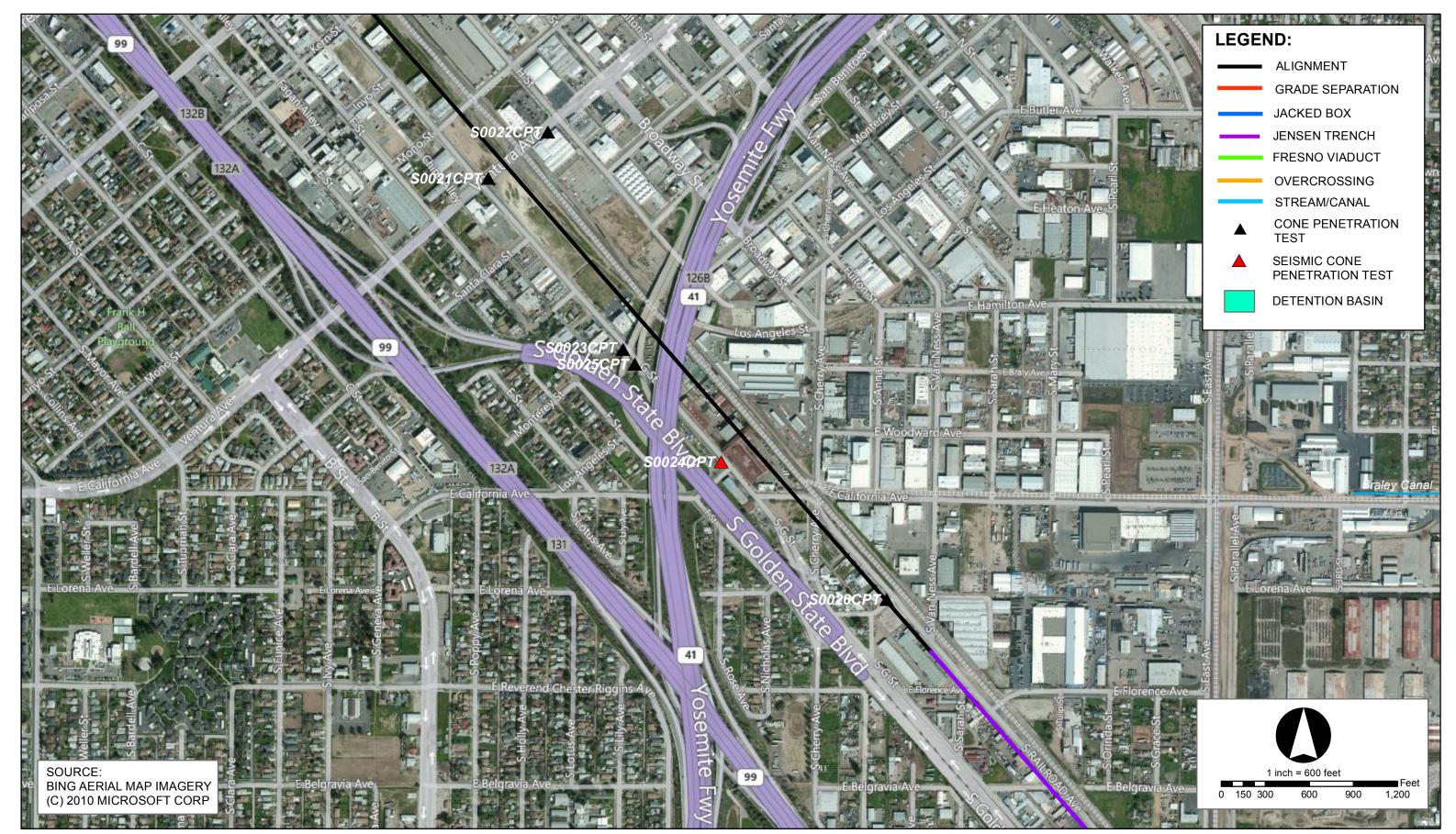


CONE PENETRATION TEST LOCATION MAP

California High Speed Train

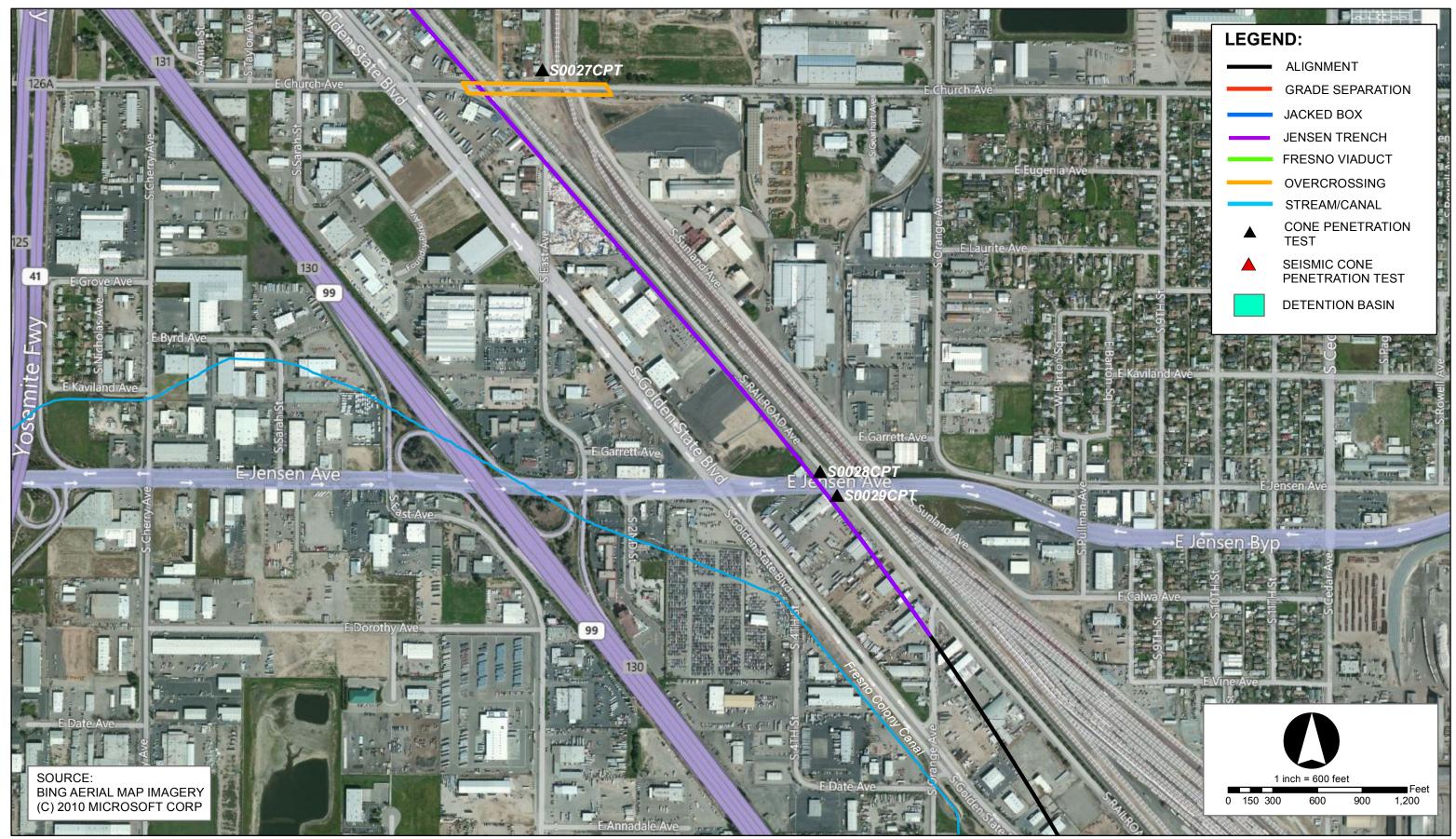
Fresno to Bakersfield

Geotechnical Data Report - Package 1











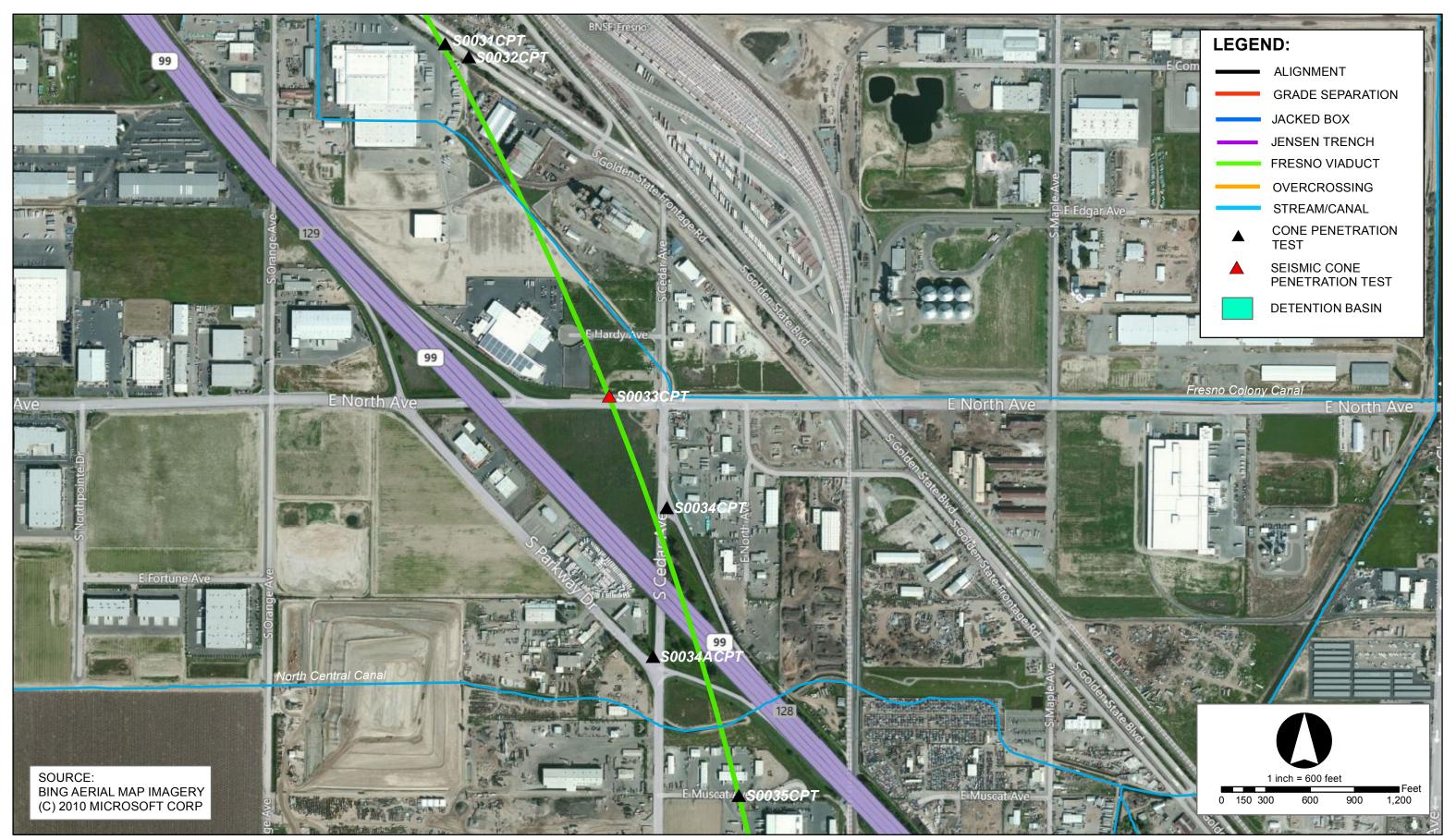


CONE PENETRATION TEST LOCATION MAP

California High Speed Train

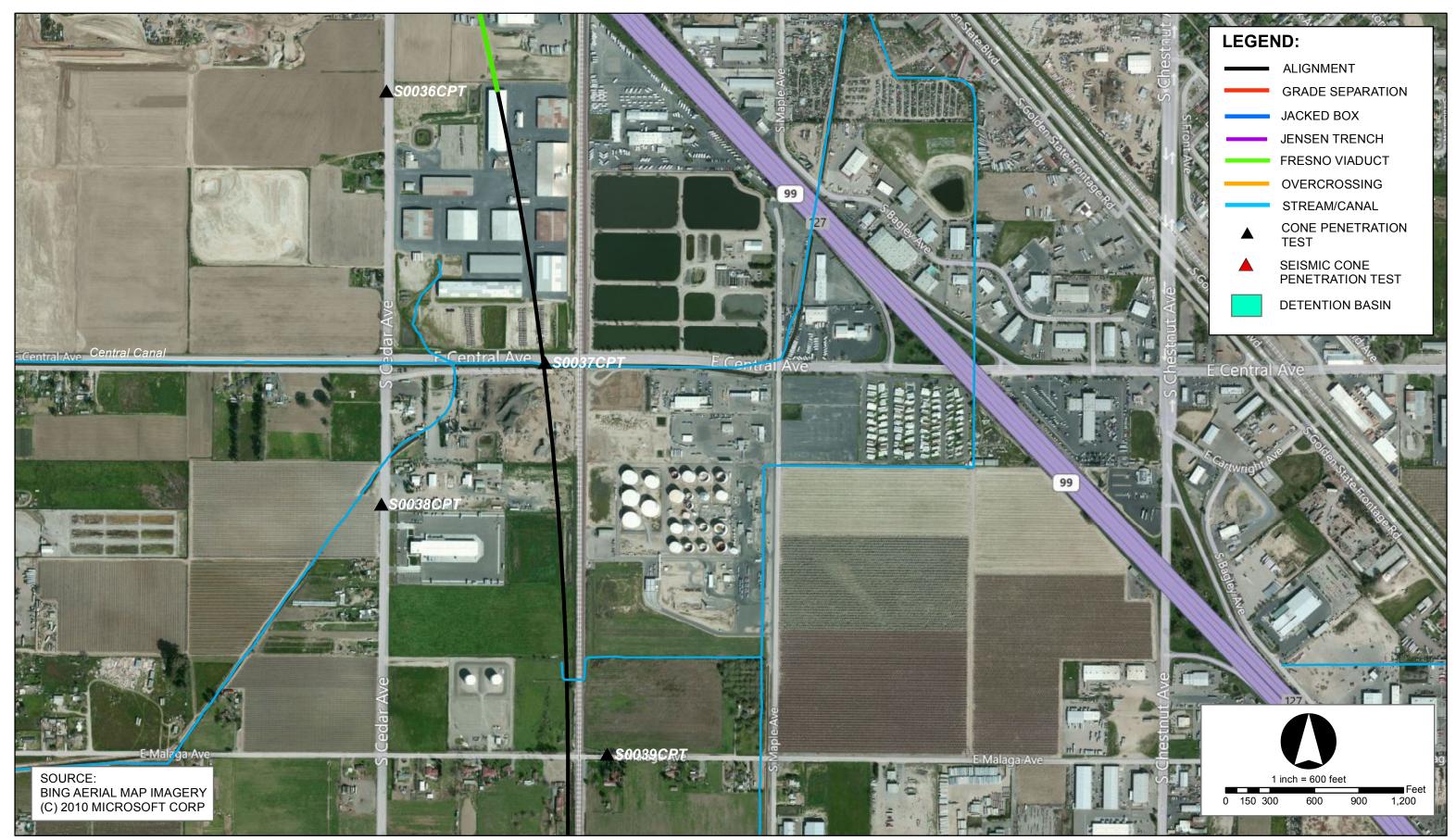
Fresno to Bakersfield

Geotechnical Data Report - Package 1



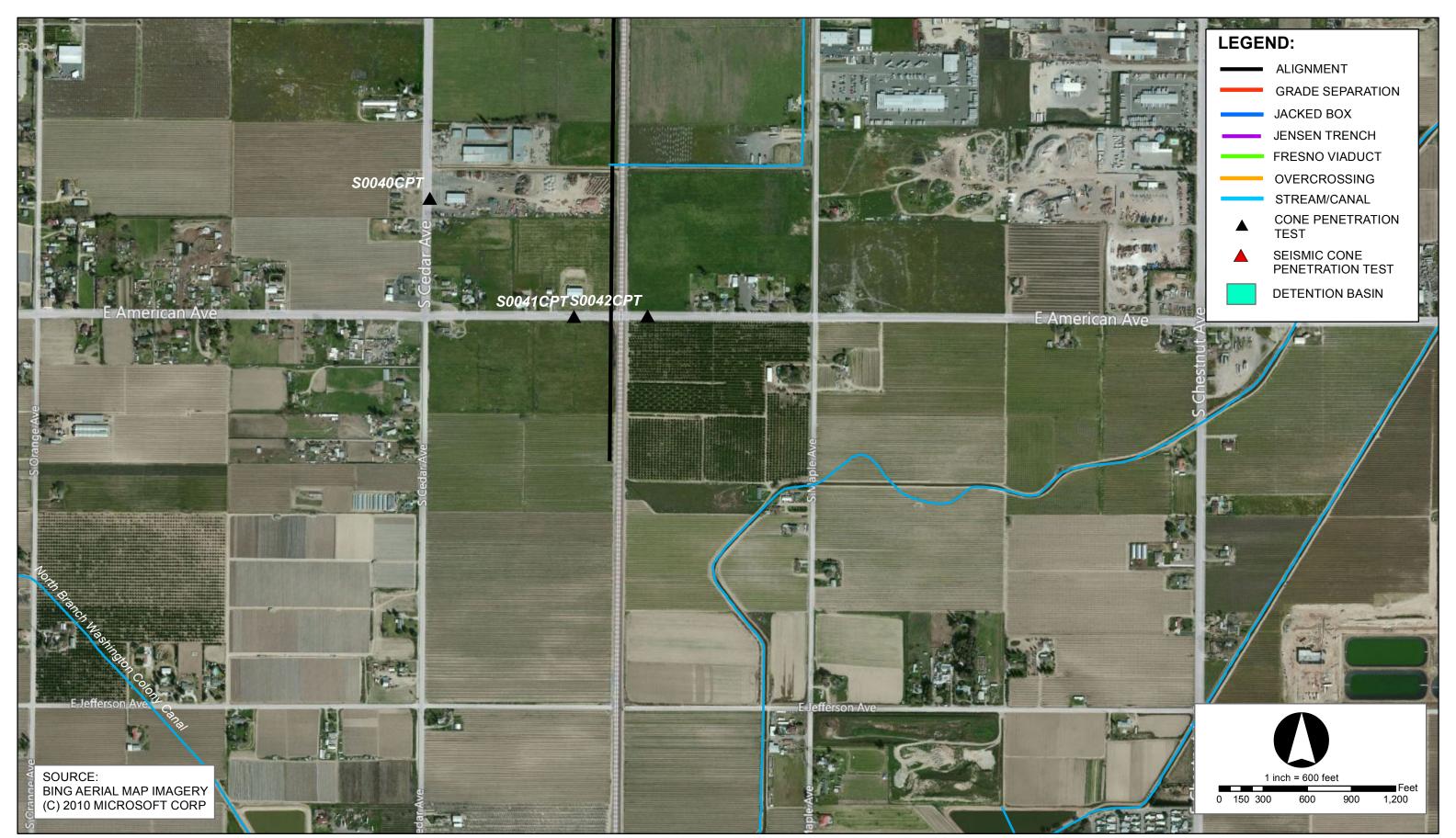












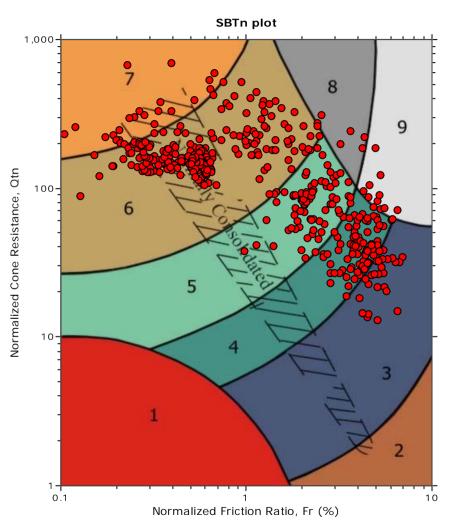


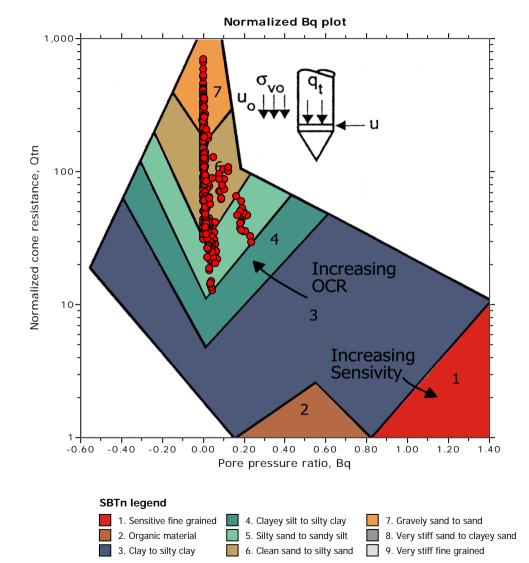


Cone Operator: T.Patterson

Project: California High-Speed Train

Location: Fresno, CA







Location: Fresno, CA

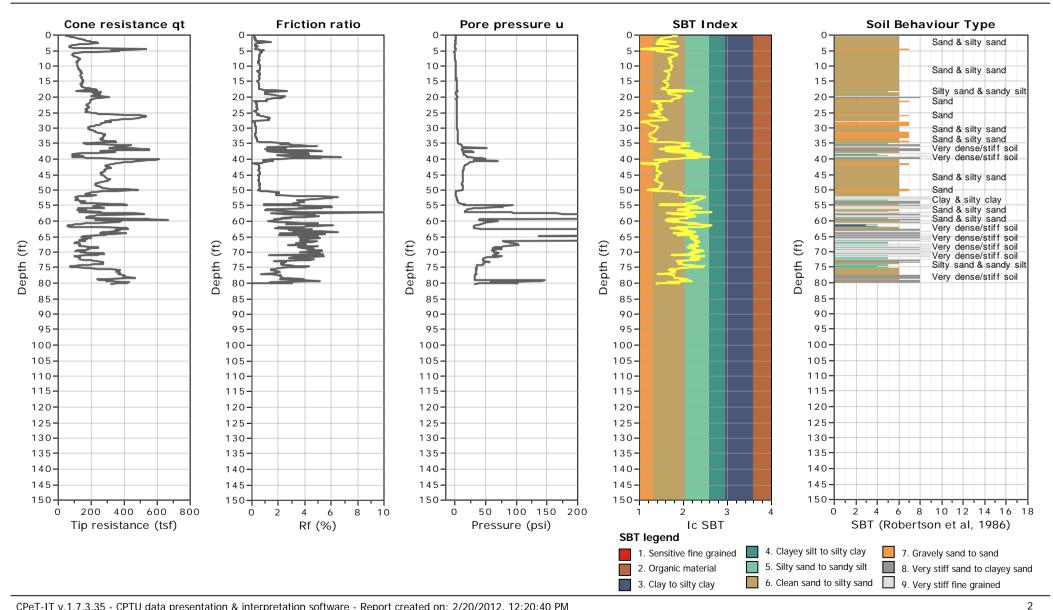
**CPT: S0001CPT** 

Total depth: 80.22 ft Surface Elevation: 296.62 ft

Coords: X:6316493.00, Y:2165094.75

Cone Type: GDC-27

Cone Operator: T.Patterson



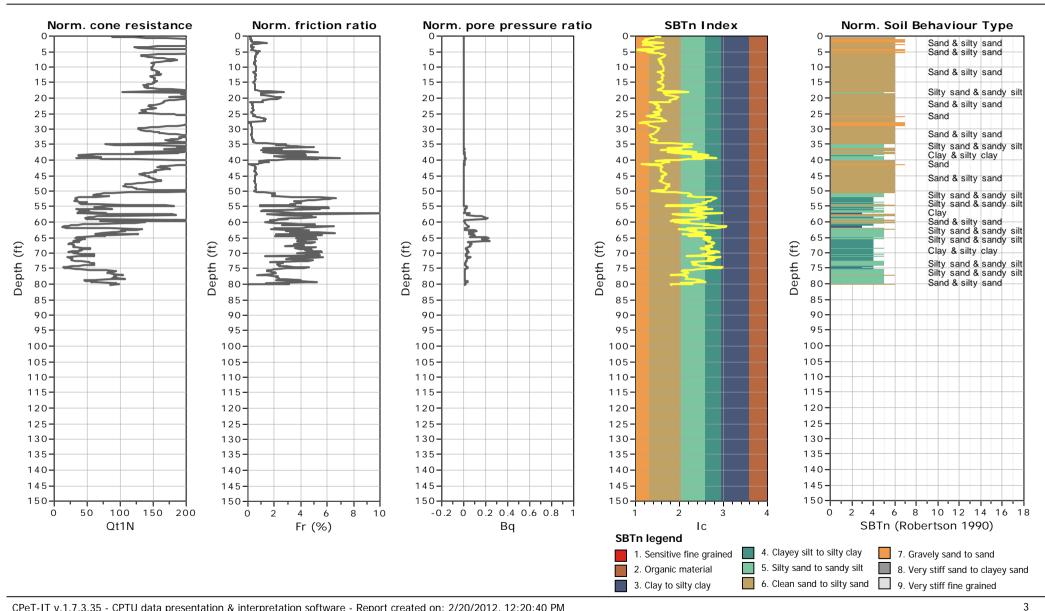


Location: Fresno, CA

Total depth: 80.22 ft Surface Elevation: 296.62 ft

Coords: X:6316493.00, Y:2165094.75

Cone Type: GDC-27 Cone Operator: T.Patterson



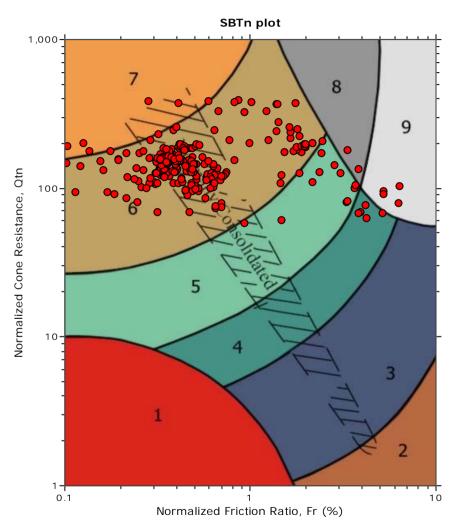


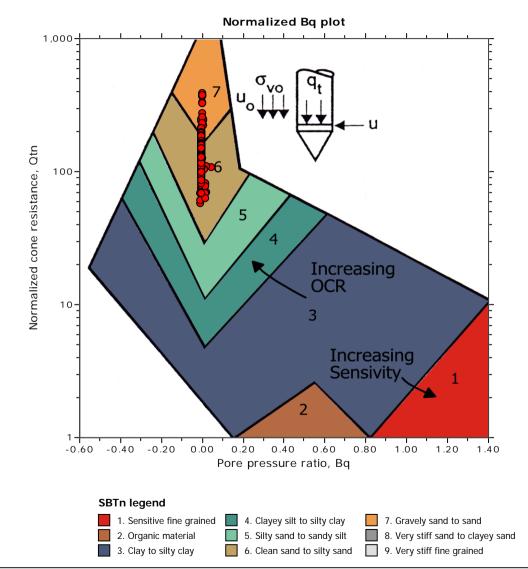
Location: Fresno, CA

Total depth: 50.03 ft Surface Elevation: 293.72 ft

Coords: X:6317351.00, Y:2164037.00

Cone Type: GDC-51
Cone Operator: A.Sancen





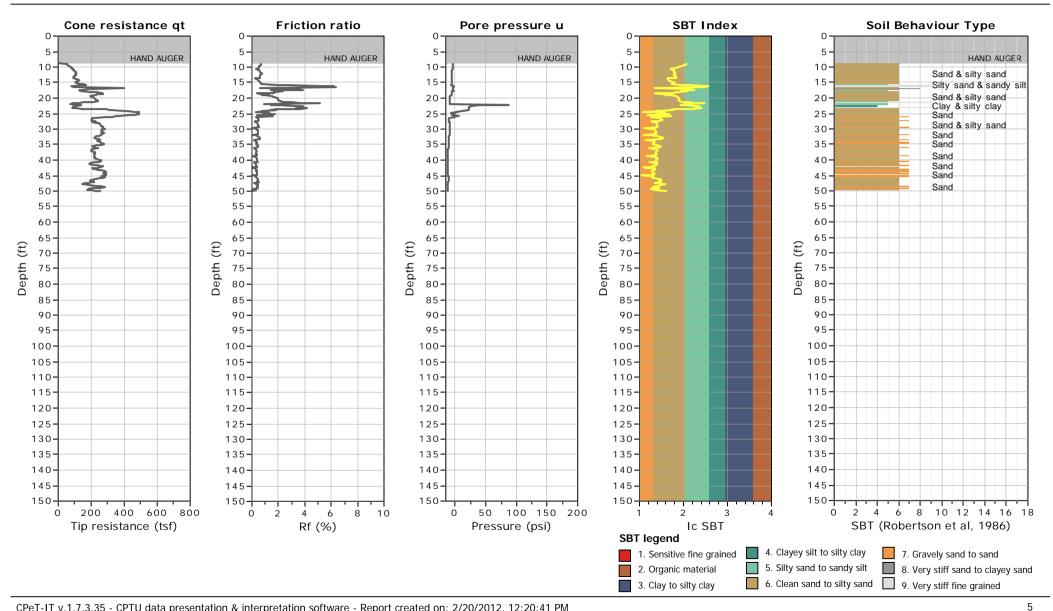


Location: Fresno, CA

Total depth: 50.03 ft Surface Elevation: 293.72 ft

Coords: X:6317351.00, Y:2164037.00

Cone Type: GDC-51 Cone Operator: A.Sancen



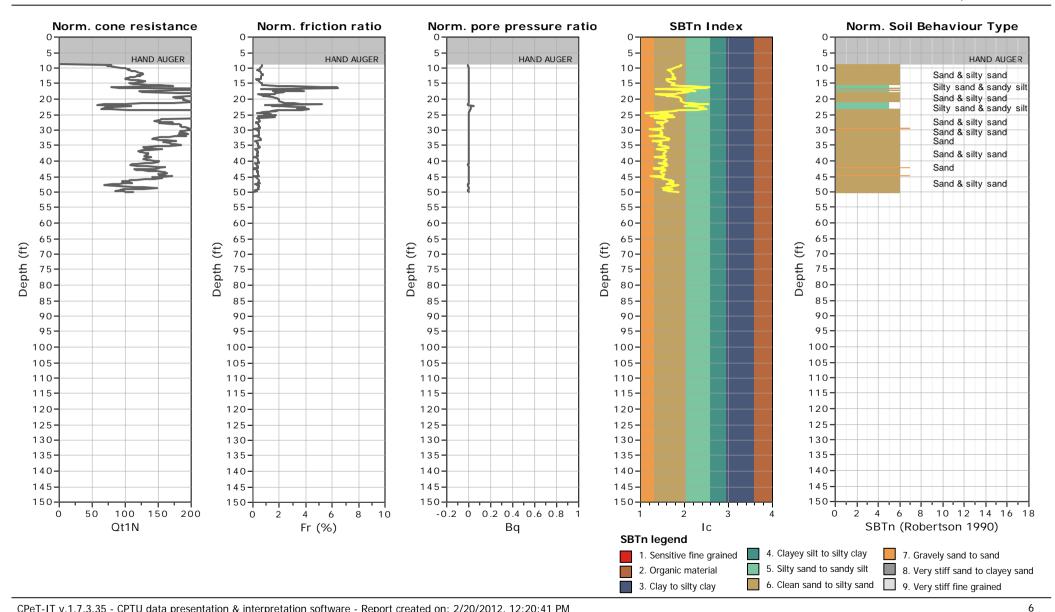


Location: Fresno, CA

Total depth: 50.03 ft Surface Elevation: 293.72 ft

Coords: X:6317351.00, Y:2164037.00

Cone Type: GDC-51 Cone Operator: A.Sancen



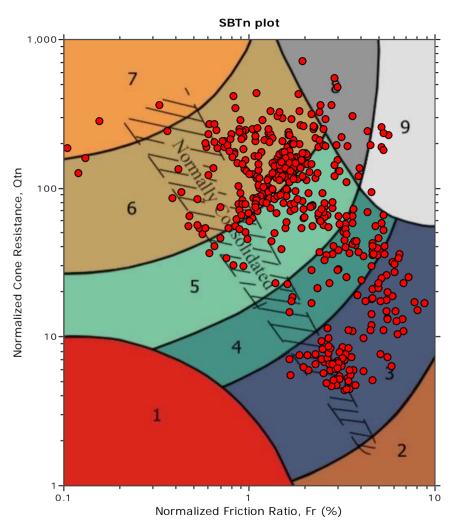


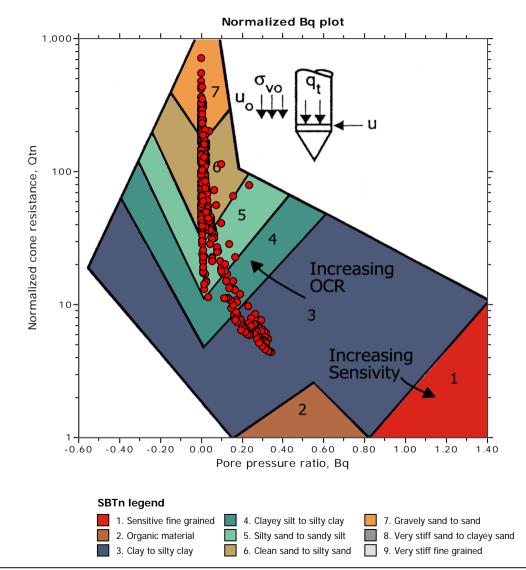
Location: Fresno, CA

Total depth: 80.22 ft Surface Elevation: 287.52 ft

Coords: X:6318312.50, Y:2162577.25

Cone Type: GDC-27 Cone Operator: T.Patterson





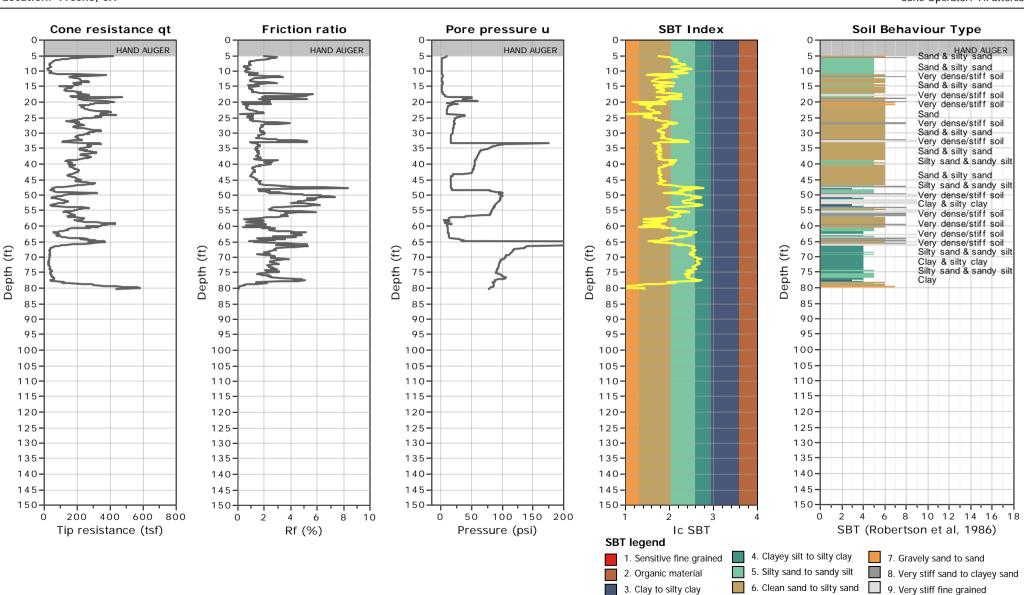


Location: Fresno, CA

Total depth: 80.22 ft Surface Elevation: 287.52 ft

Coords: X:6318312.50, Y:2162577.25

Cone Type: GDC-27
Cone Operator: T.Patterson





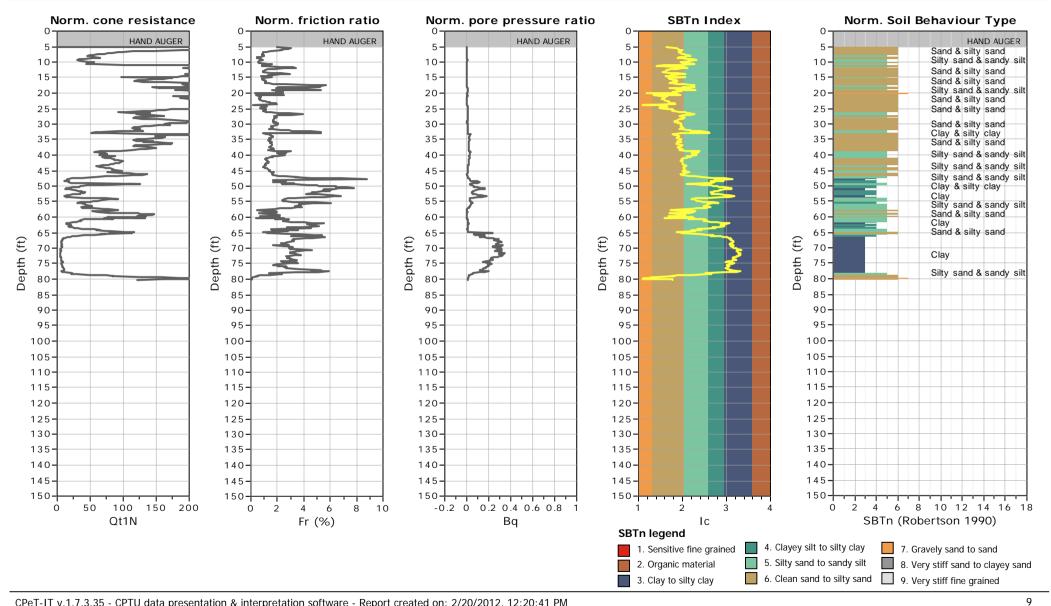
Location: Fresno, CA

Total depth: 80.22 ft

Surface Elevation: 287.52 ft Coords: X:6318312.50, Y:2162577.25

Cone Type: GDC-27

Cone Operator: T.Patterson



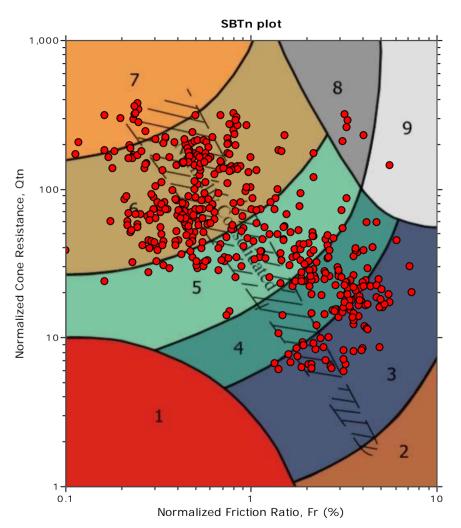


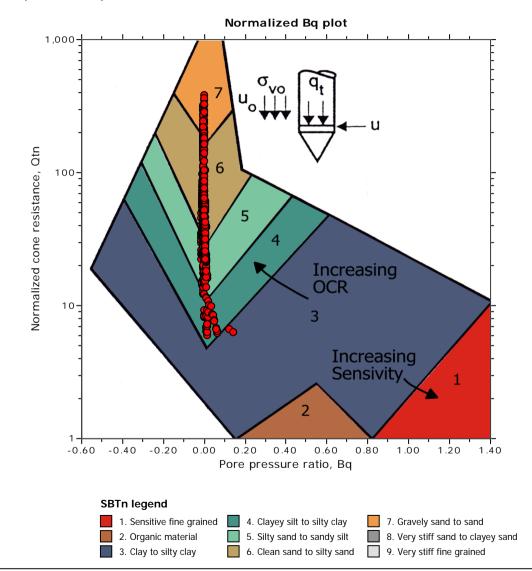
Location: Fresno, CA

Total depth: 80.71 ft Surface Elevation: 289.24 ft

Coords: X:6318980.00, Y:2162522.50

Cone Type: GDC-27 Cone Operator: T.Patterson







Location: Fresno, CA

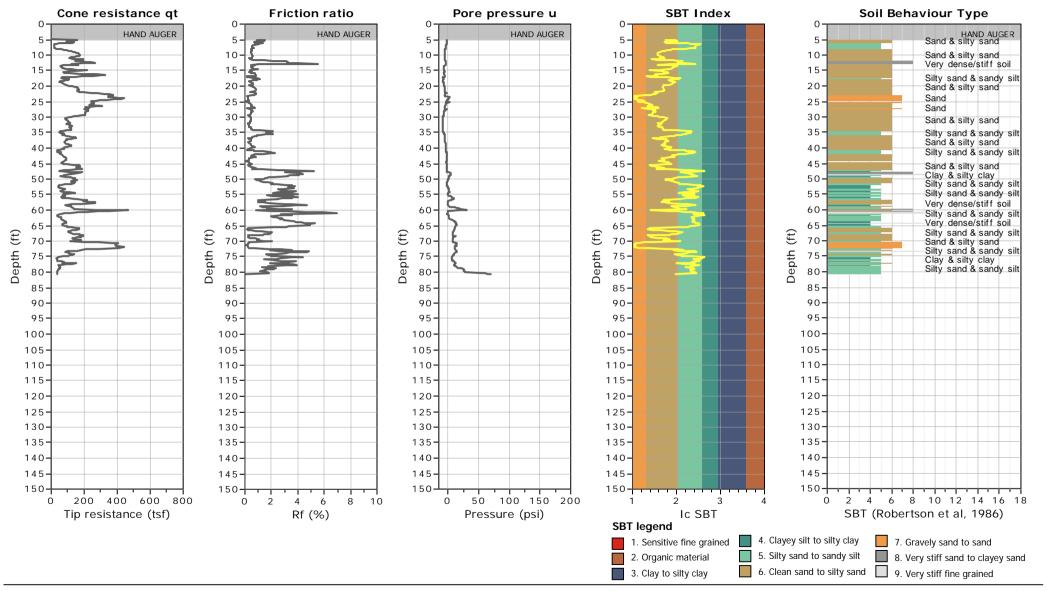
CPT: S0004CPT

Total depth: 80.71 ft Surface Elevation: 289.24 ft

Coords: X:6318980.00, Y:2162522.50

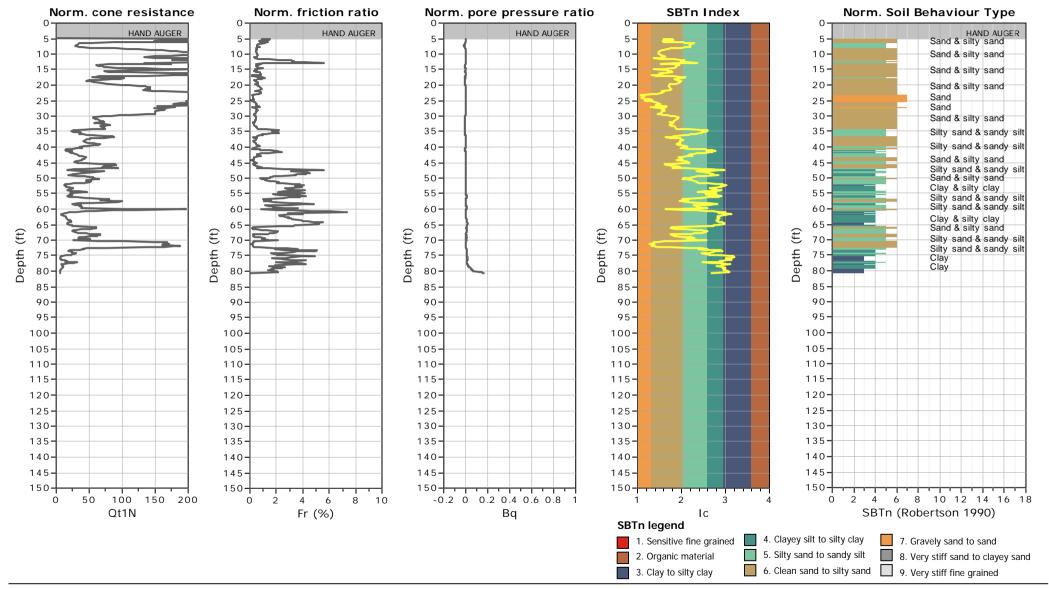
Cone Type: GDC-27



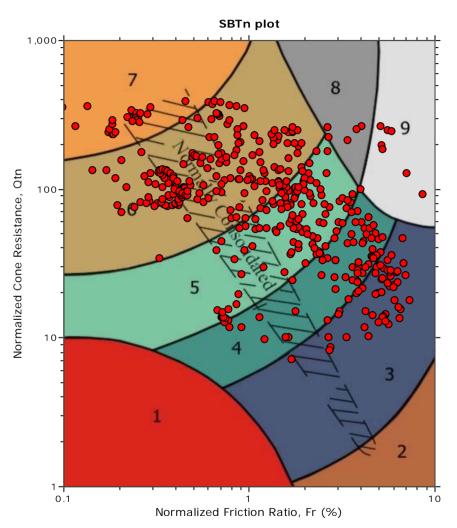


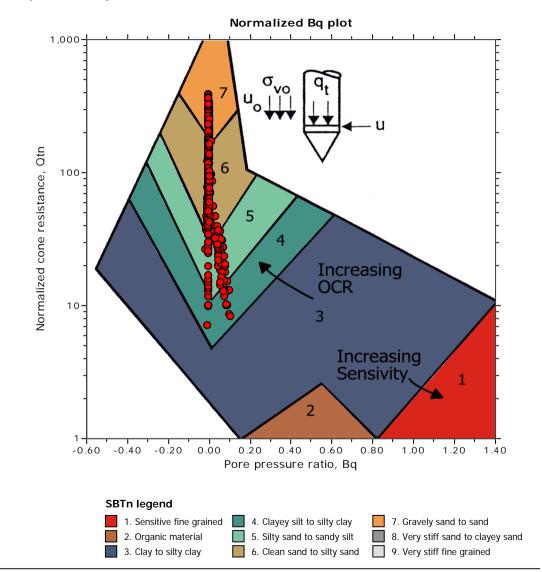
Coords: X:6318980.00, Y:2162522.50





Location: Fresno, CA



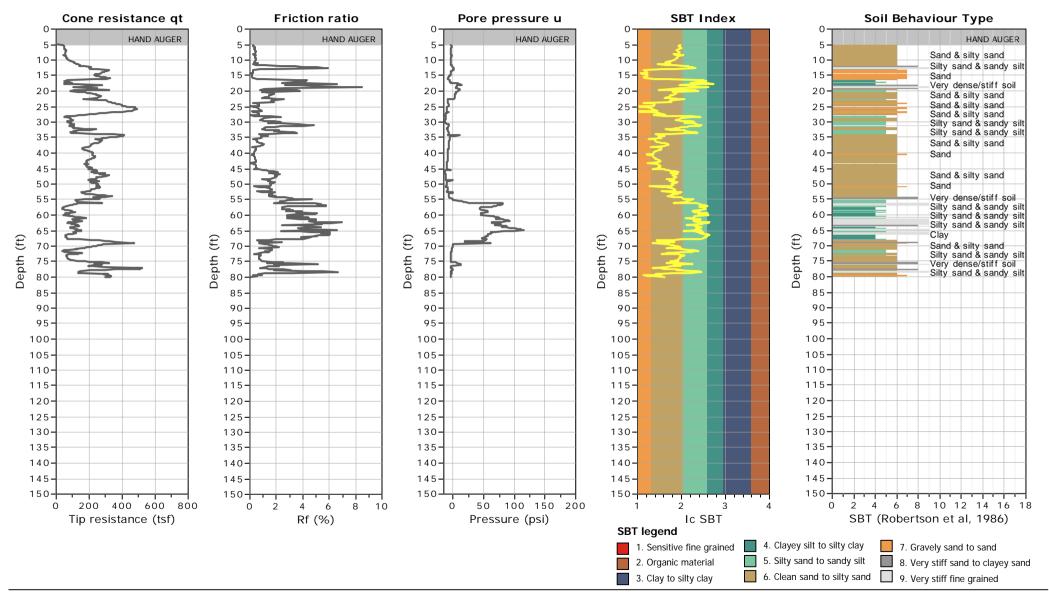


Surface Elevation: 292.46 ft



Location: Fresno, CA

Coords: X:6321691.50, Y:2159881.50 Project: California High-Speed Train Cone Type: GDC-27 Cone Operator: T.Patterson

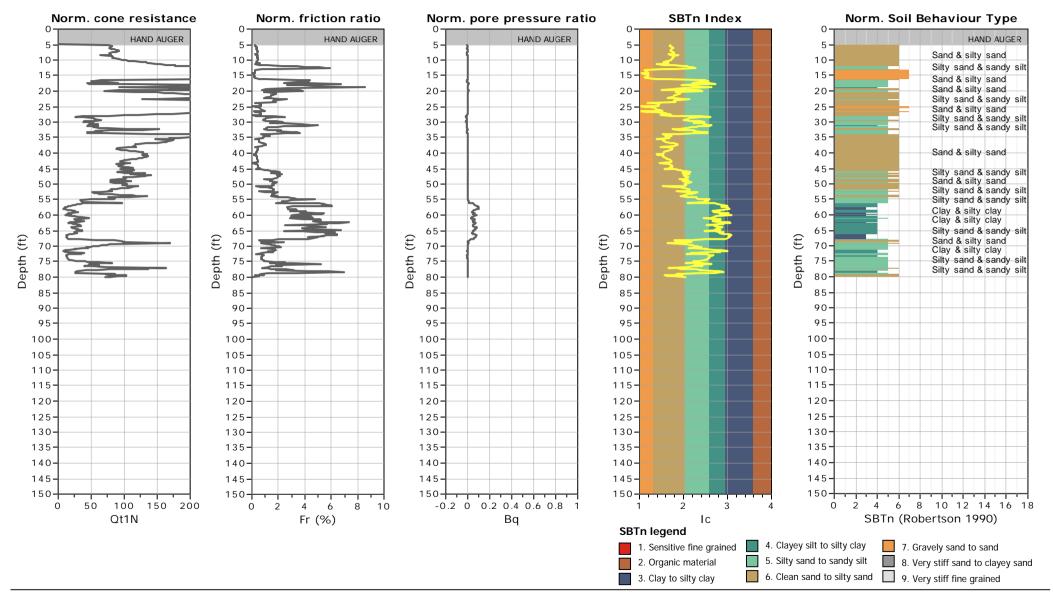


Coords: X:6321691.50, Y:2159881.50



Location: Fresno, CA

Project: California High-Speed Train Cone Type: GDC-27 Cone Operator: T.Patterson



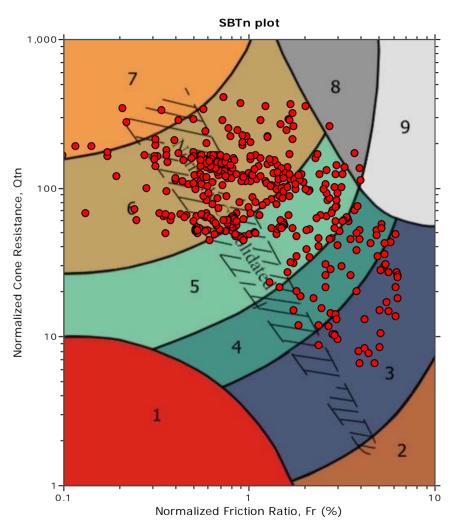


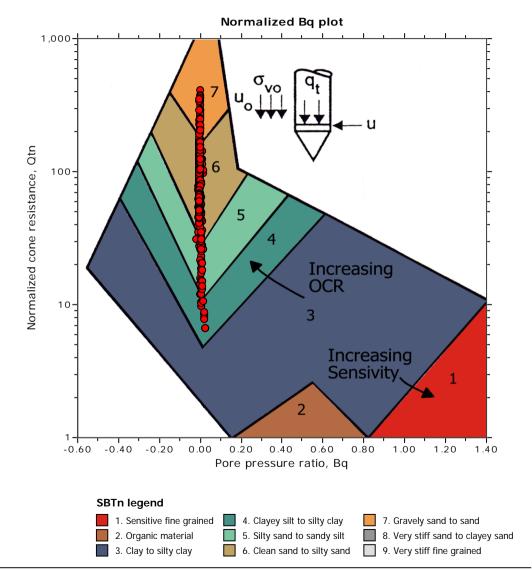
Location: Fresno, CA

Total depth: 80.05 ft Surface Elevation: 295.07 ft

Coords: X:6320967.00, Y:2159855.50

Cone Type: GDC-27 Cone Operator: T.Patterson







Location: Fresno, CA

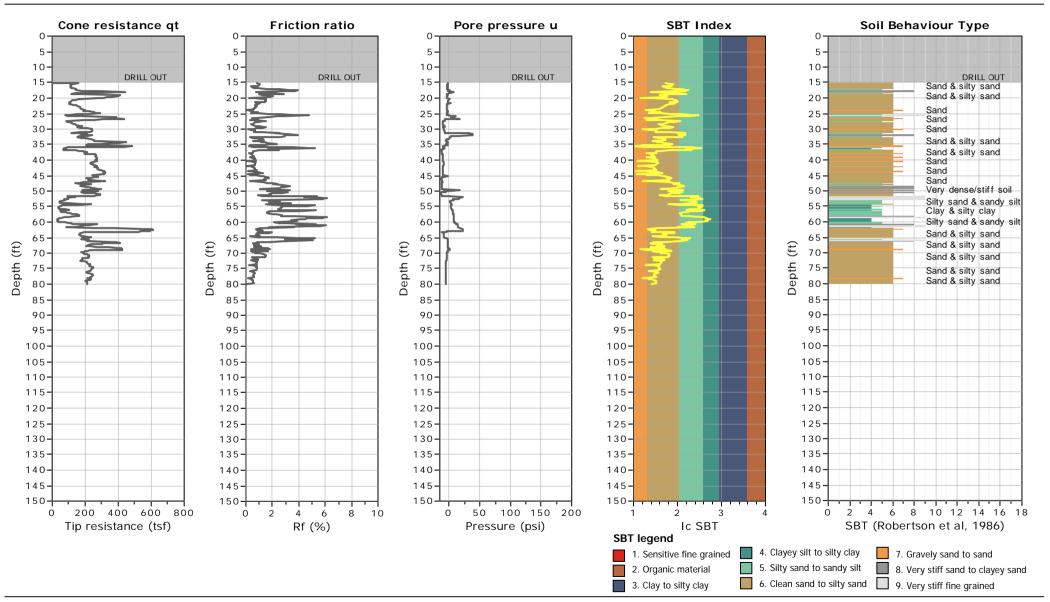
CPT: S0006CPT Total depth: 80.05 ft

Surface Elevation: 295.07 ft

Coords: X:6320967.00, Y:2159855.50

Cone Type: GDC-27

Cone Operator: T.Patterson





Location: Fresno, CA

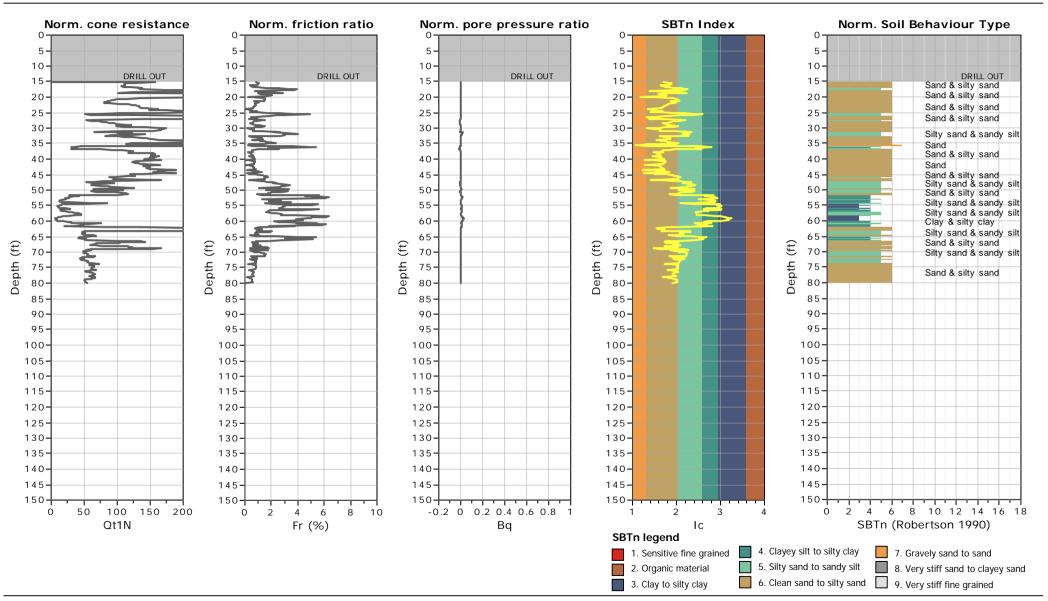
CPT: S0006CPT

Total depth: 80.05 ft Surface Elevation: 295.07 ft

Coords: X:6320967.00, Y:2159855.50

Cone Type: GDC-27

Cone Operator: T.Patterson



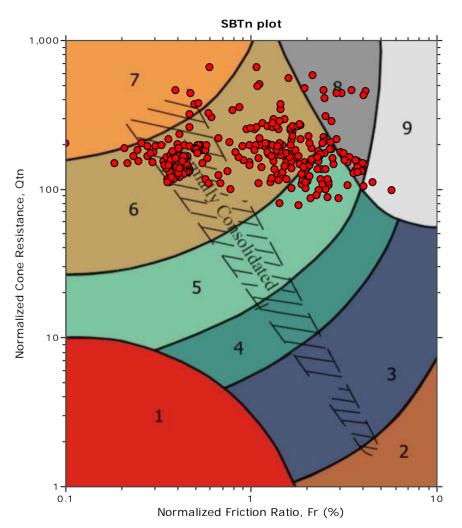


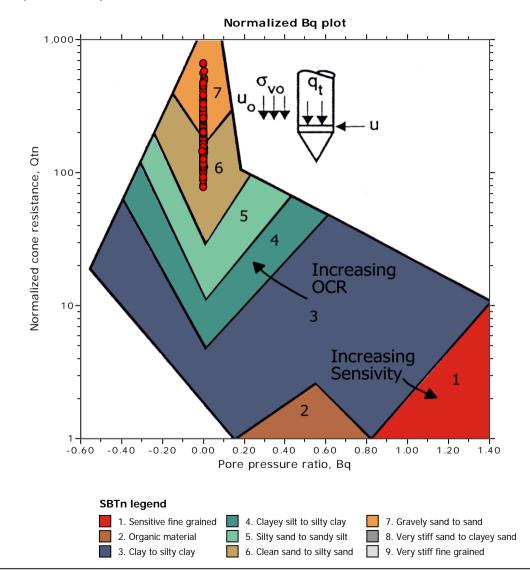
Location: Fresno, CA

Total depth: 52.49 ft Surface Elevation: 290.05 ft

Coords: X:6322193.50, Y:2158796.75

Cone Type: GDC-24
Cone Operator: A.Sancen





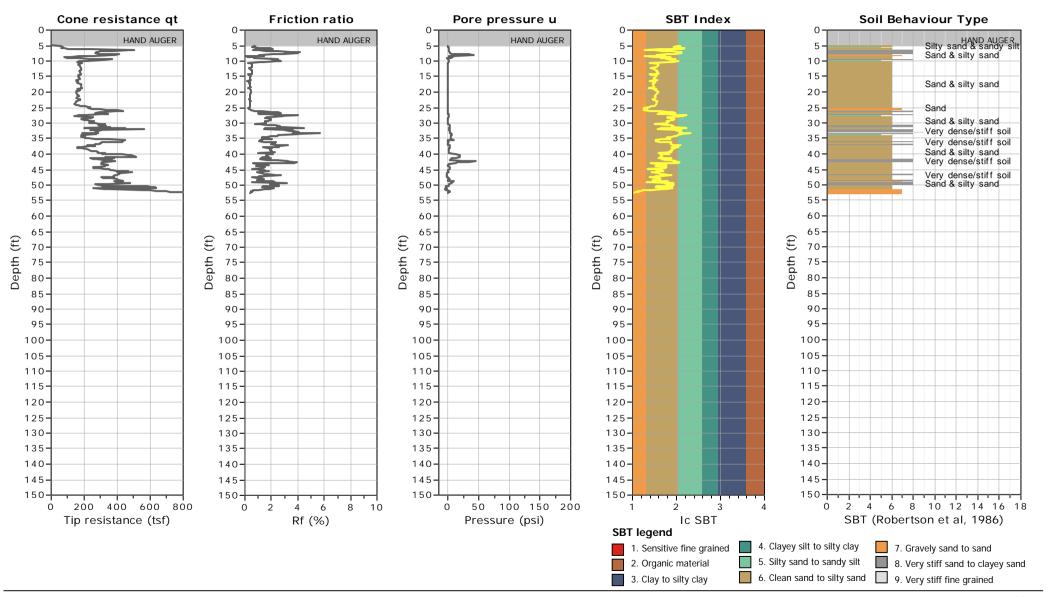


Location: Fresno, CA

Total depth: 52.49 ft Surface Elevation: 290.05 ft

Coords: X:6322193.50, Y:2158796.75

Cone Type: GDC-24
Cone Operator: A.Sancen





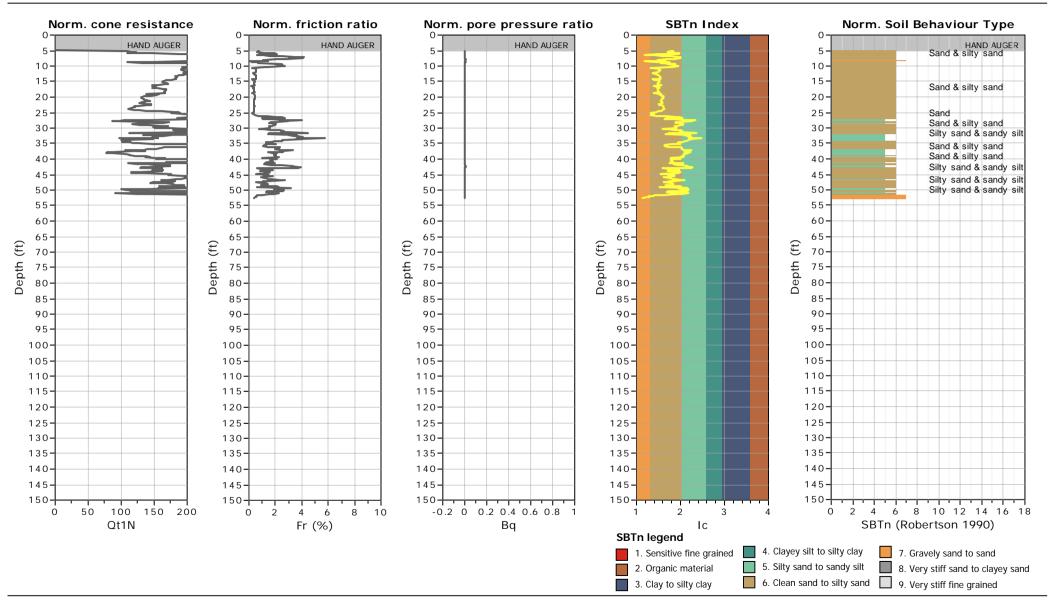
Location: Fresno, CA

Total depth: 52.49 ft

Surface Elevation: 290.05 ft Coords: X:6322193.50, Y:2158796.75

Cone Type: GDC-24

Cone Operator: A.Sancen



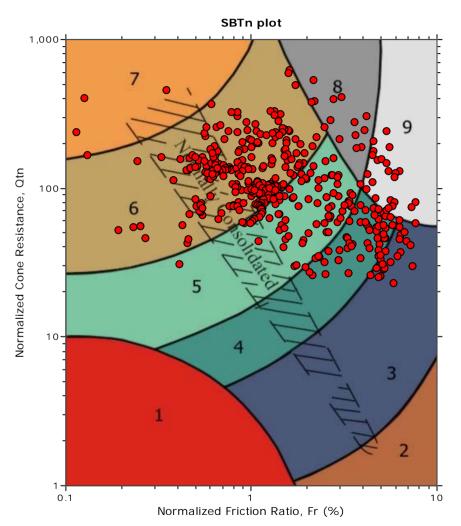


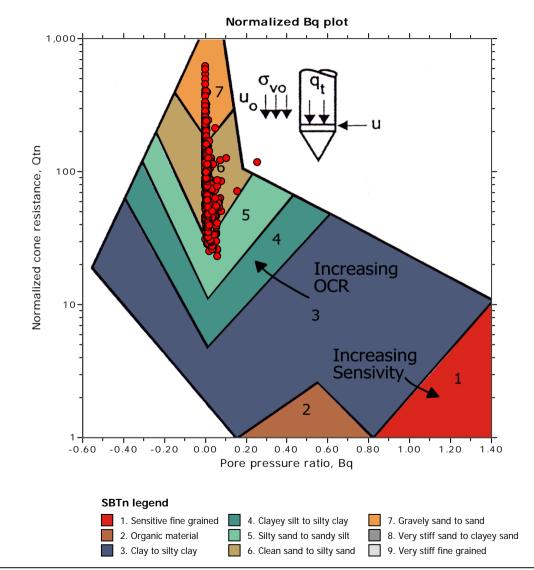
Location: Fresno, CA

Total depth: 76.44 ft Surface Elevation: 287.06 ft

Coords: X:6323012.00, Y:2157330.25

Cone Type: GDC-51
Cone Operator: A.Sancen





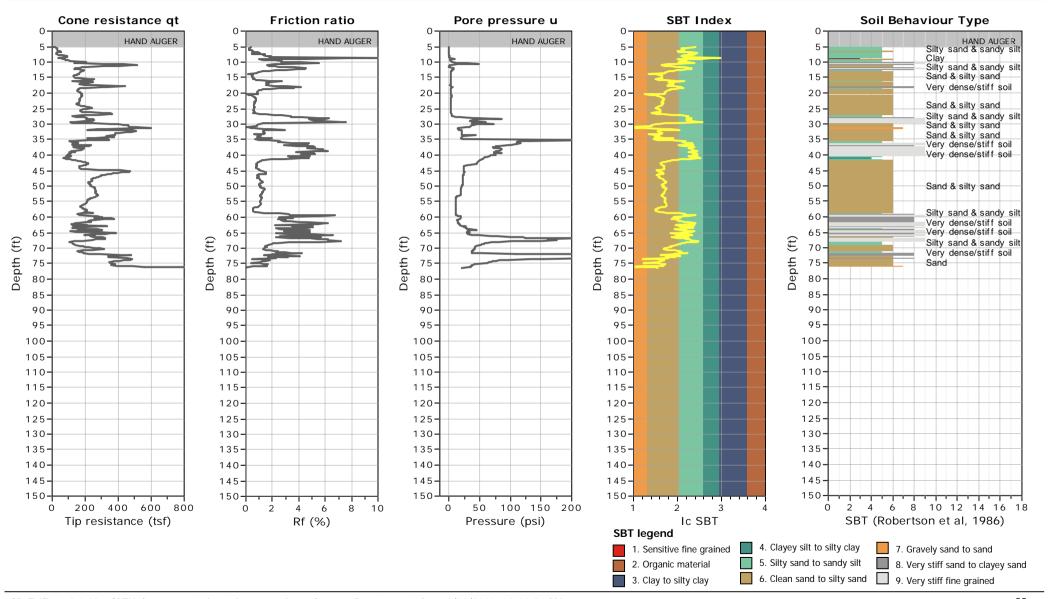


Location: Fresno, CA

Total depth: 76.44 ft Surface Elevation: 287.06 ft

Coords: X:6323012.00, Y:2157330.25

Cone Type: GDC-51
Cone Operator: A.Sancen



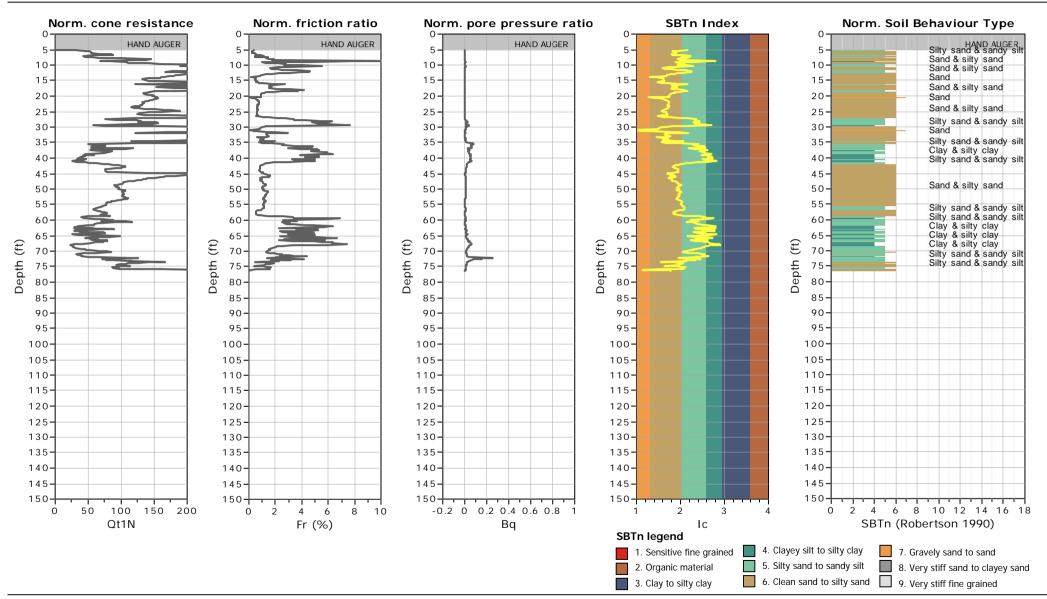


Location: Fresno, CA

Total depth: 76.44 ft Surface Elevation: 287.06 ft

Coords: X:6323012.00, Y:2157330.25

Cone Type: GDC-51
Cone Operator: A.Sancen



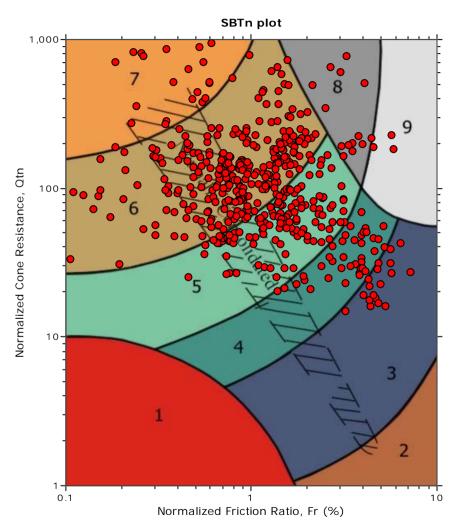


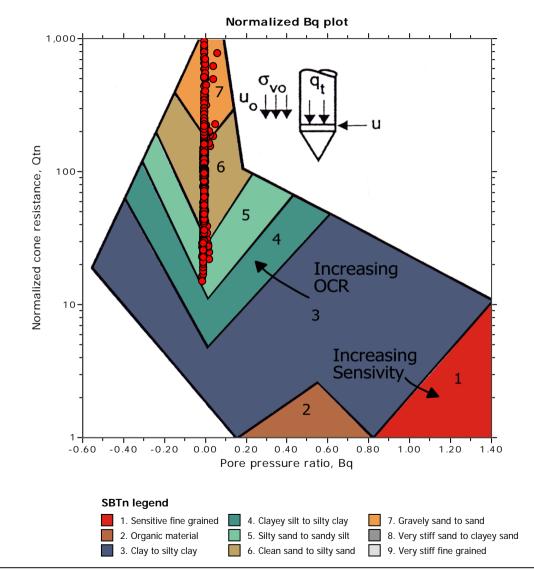
Location: Fresno, CA

Total depth: 100.23 ft Surface Elevation: 285.31 ft

Coords: X:6324017.00, Y:2156853.75

Cone Type: GDC-52
Cone Operator: A.Sancen





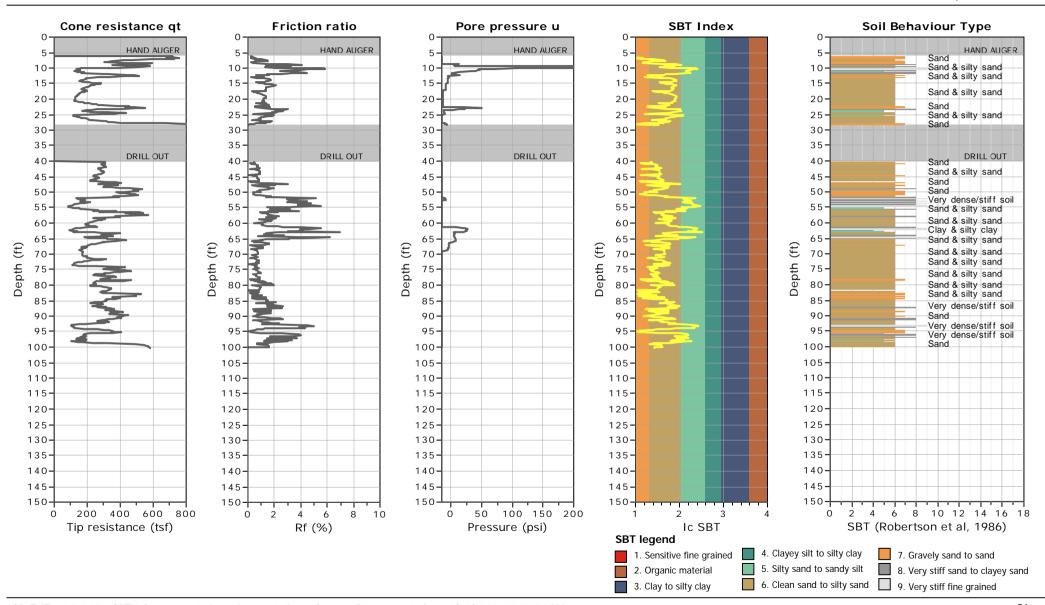


Location: Fresno, CA

Total depth: 100.23 ft Surface Elevation: 285.31 ft

Coords: X:6324017.00, Y:2156853.75

Cone Type: GDC-52
Cone Operator: A.Sancen



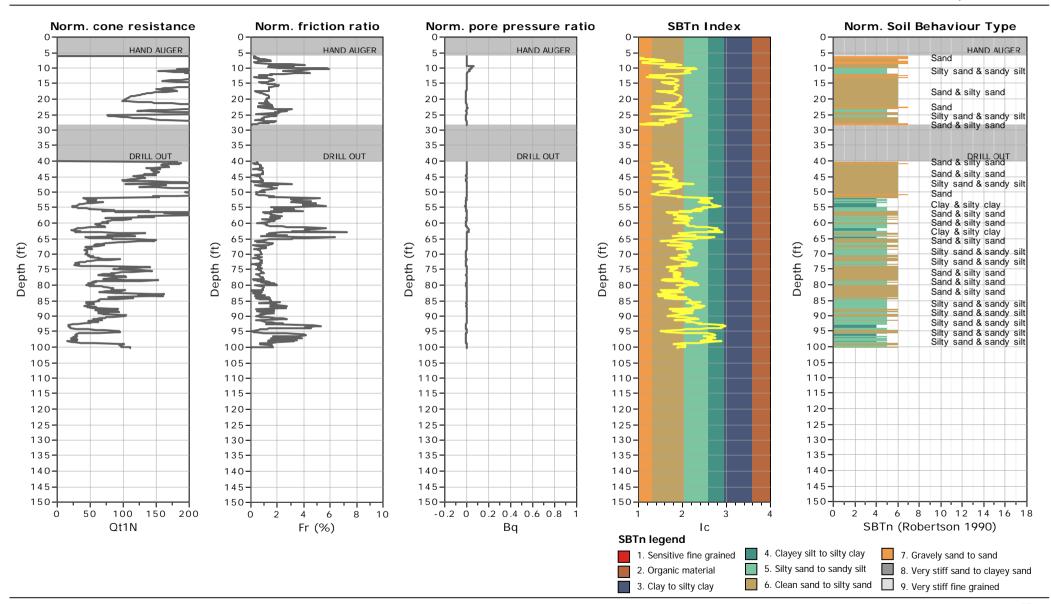


Location: Fresno, CA

Total depth: 100.23 ft Surface Elevation: 285.31 ft

Coords: X:6324017.00, Y:2156853.75

Cone Type: GDC-52 Cone Operator: A.Sancen



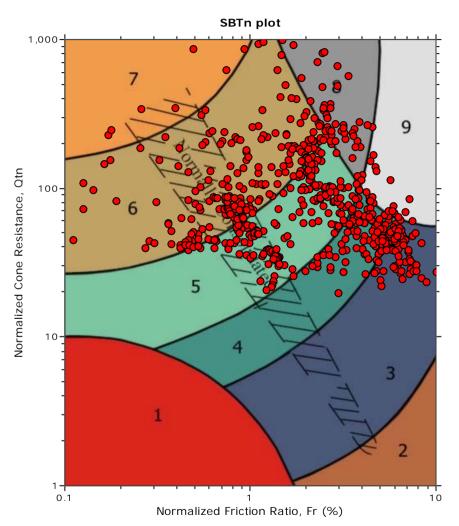


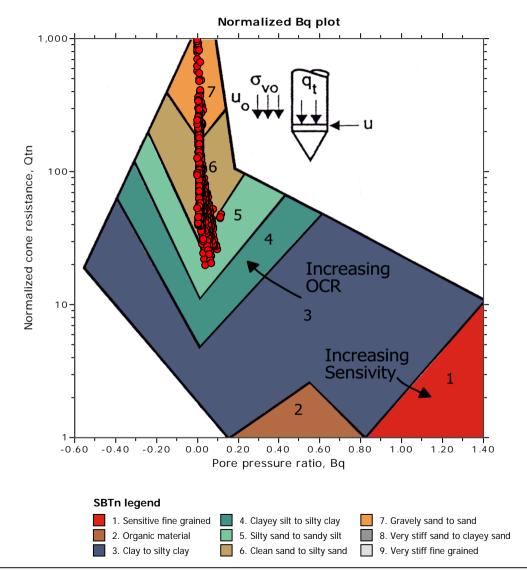
Location: Fresno, CA

Total depth: 105.81 ft Surface Elevation: 286.75 ft

Coords: X:6323848.00, Y:2157307.00

Cone Type: GDC-27 Cone Operator: T.Patterson





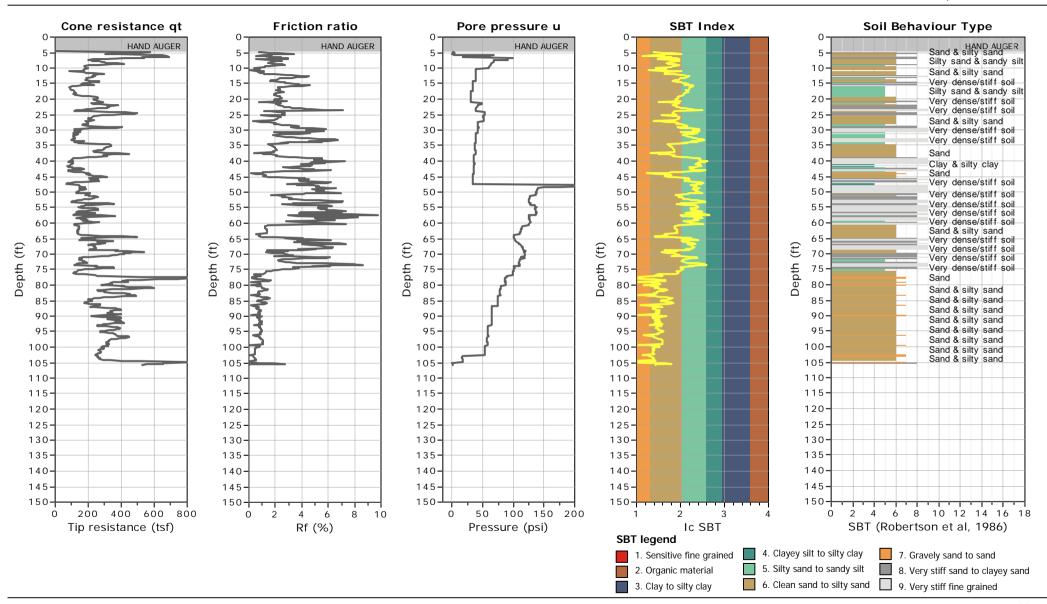


Location: Fresno, CA

Total depth: 105.81 ft Surface Elevation: 286.75 ft

Coords: X:6323848.00, Y:2157307.00

Cone Type: GDC-27
Cone Operator: T.Patterson





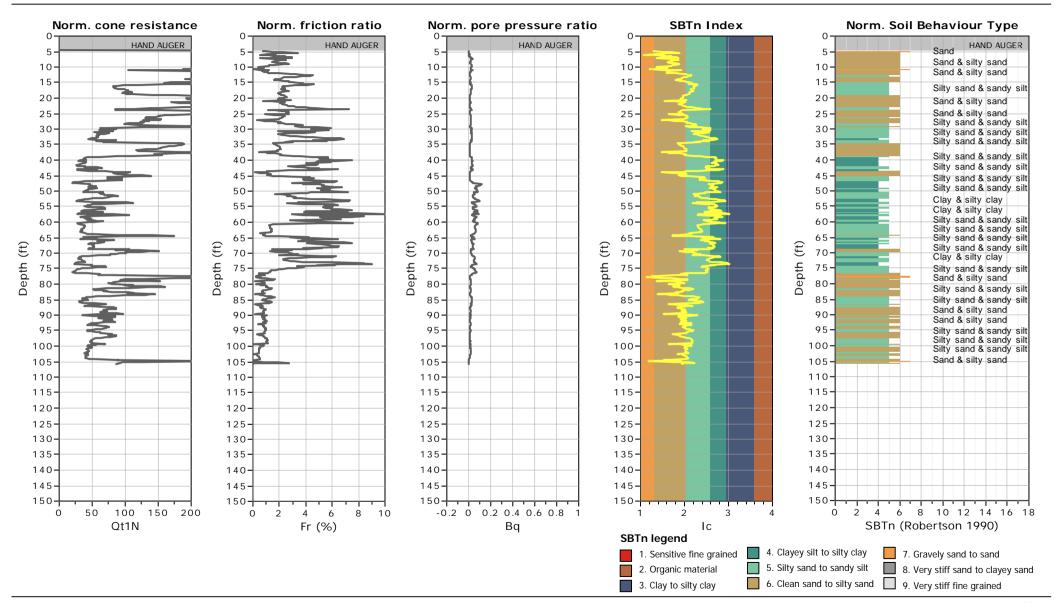
Location: Fresno, CA

Total depth: 105.81 ft Surface Elevation: 286.75 ft

Coords: X:6323848.00, Y:2157307.00

Cone Type: GDC-27

Cone Operator: T.Patterson



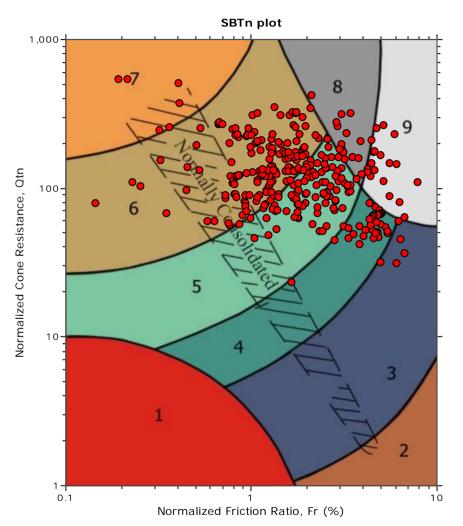


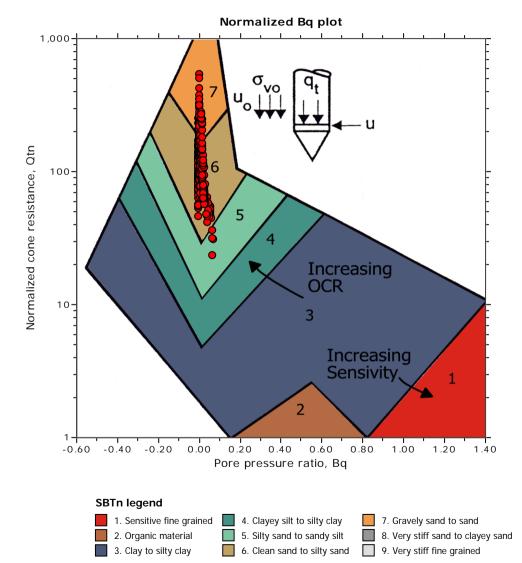
Location: Fresno, CA

Total depth: 59.22 ft Surface Elevation: 283.43 ft

Coords: X:6324305.50, Y:2156608.75

Cone Type: GDC-51
Cone Operator: A.Sancen

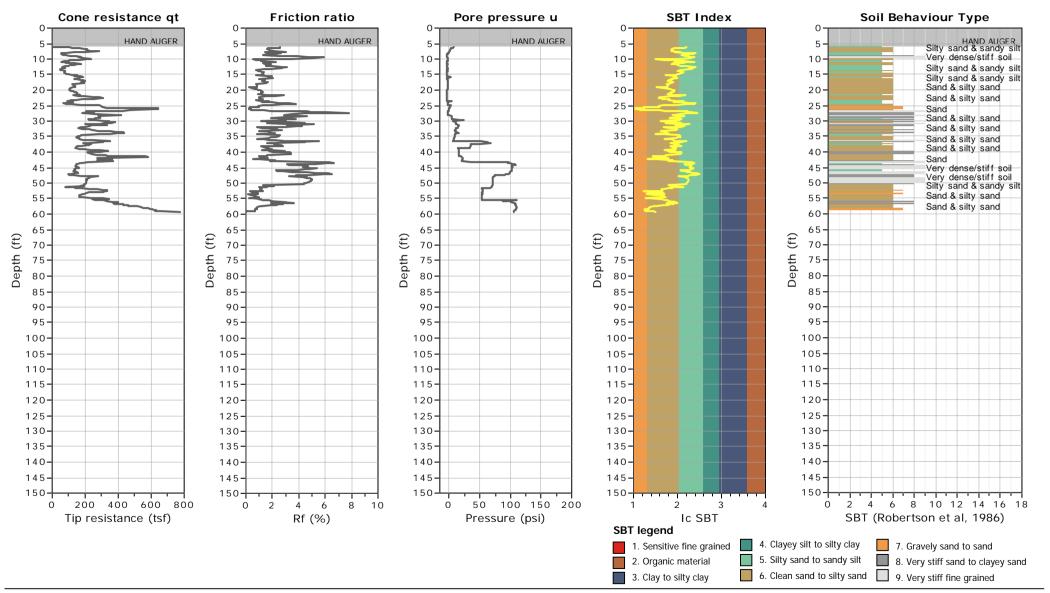




Surface Elevation: 283.43 ft



Coords: X:6324305.50, Y:2156608.75 Project: California High-Speed Train Cone Type: GDC-51 Location: Fresno, CA Cone Operator: A.Sancen



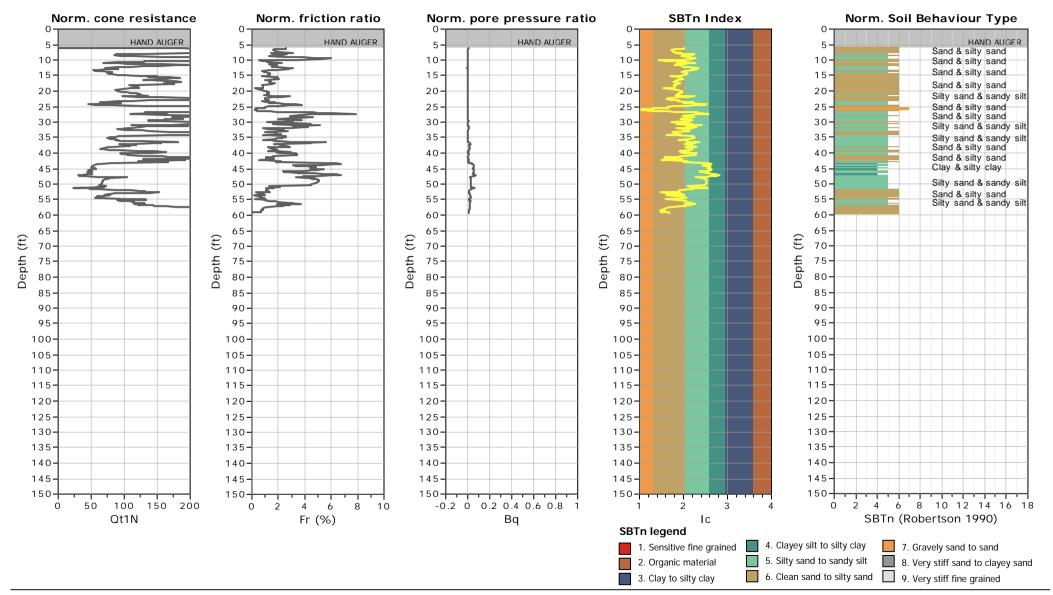


Location: Fresno, CA

Coords: X:6324305.50, Y:2156608.75 Cone Type: GDC-51

Cone Operator: A.Sancen

Surface Elevation: 283.43 ft



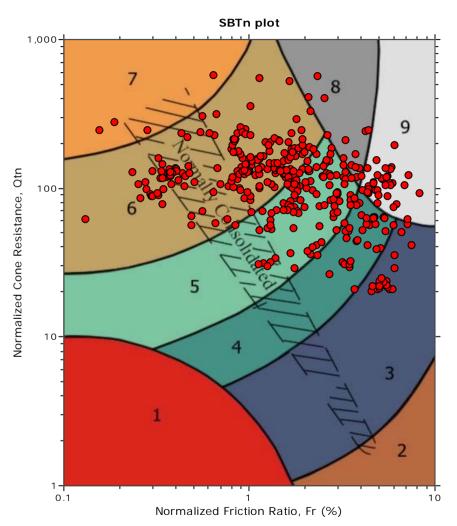


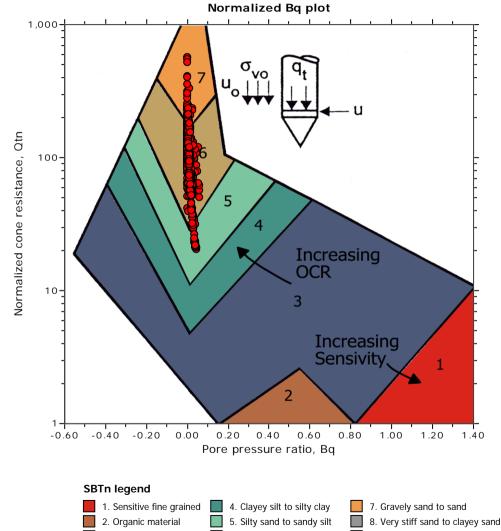
Location: Fresno, CA

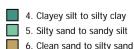
Total depth: 66.60 ft Surface Elevation: 284.44 ft

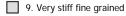
Coords: X:6324747.00, Y:2156091.75

Cone Type: GDC-27 Cone Operator: T.Patterson









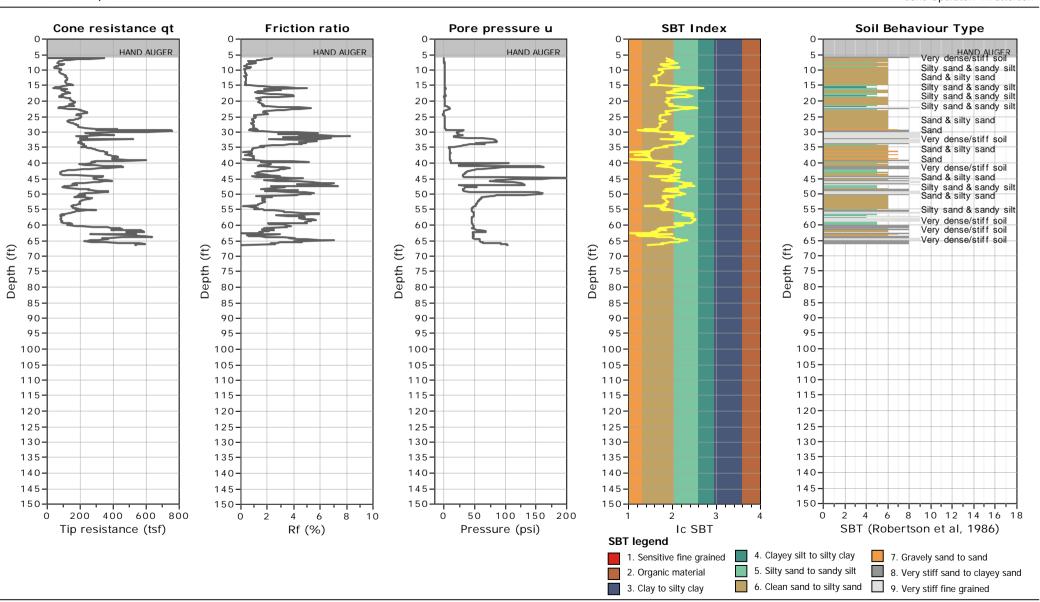


Location: Fresno, CA

Total depth: 66.60 ft Surface Elevation: 284.44 ft

Coords: X:6324747.00, Y:2156091.75

Cone Type: GDC-27
Cone Operator: T.Patterson



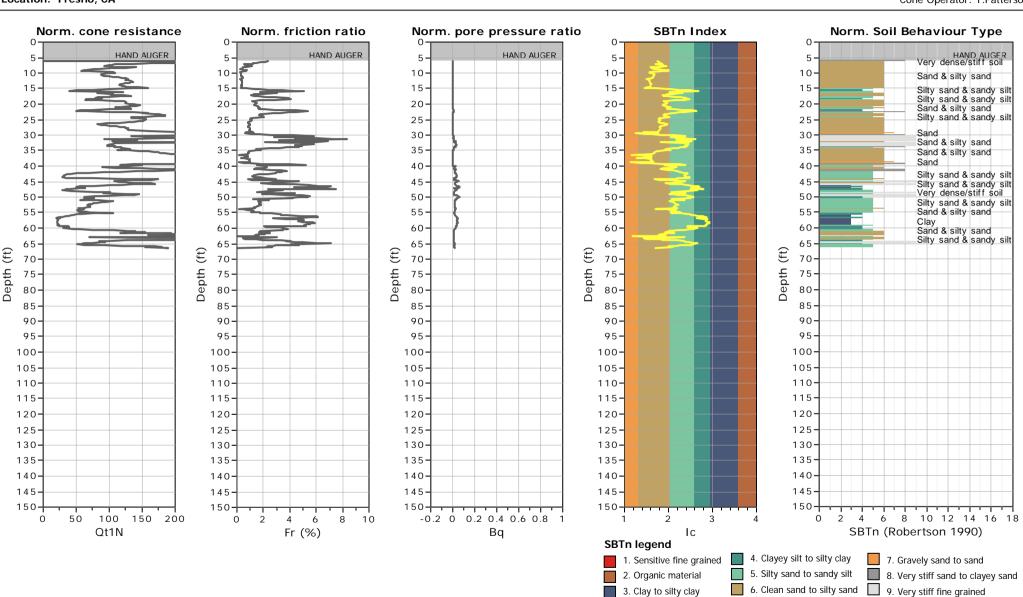


Location: Fresno, CA

Total depth: 66.60 ft Surface Elevation: 284.44 ft

Coords: X:6324747.00, Y:2156091.75

Cone Type: GDC-27 Cone Operator: T.Patterson



3. Clay to silty clay

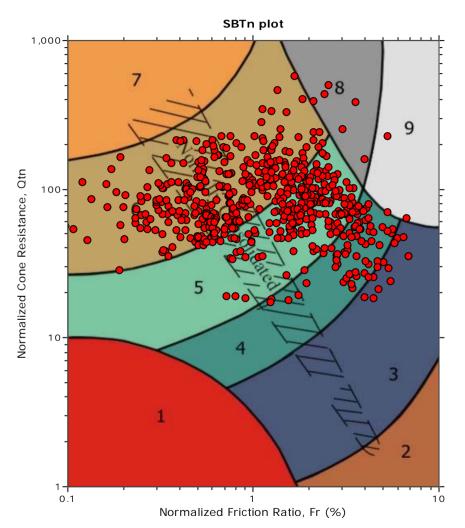


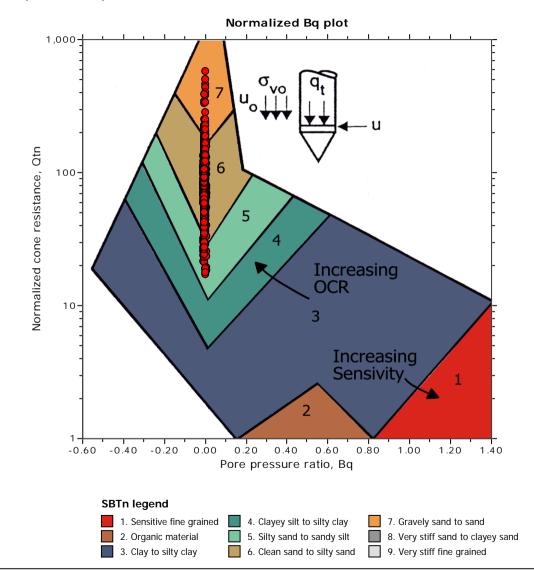
Location: Fresno, CA

Total depth: 102.69 ft Surface Elevation: 288.85 ft

Coords: X:6324548.50, Y:2155038.00

Cone Type: GDC-51
Cone Operator: A.Sancen



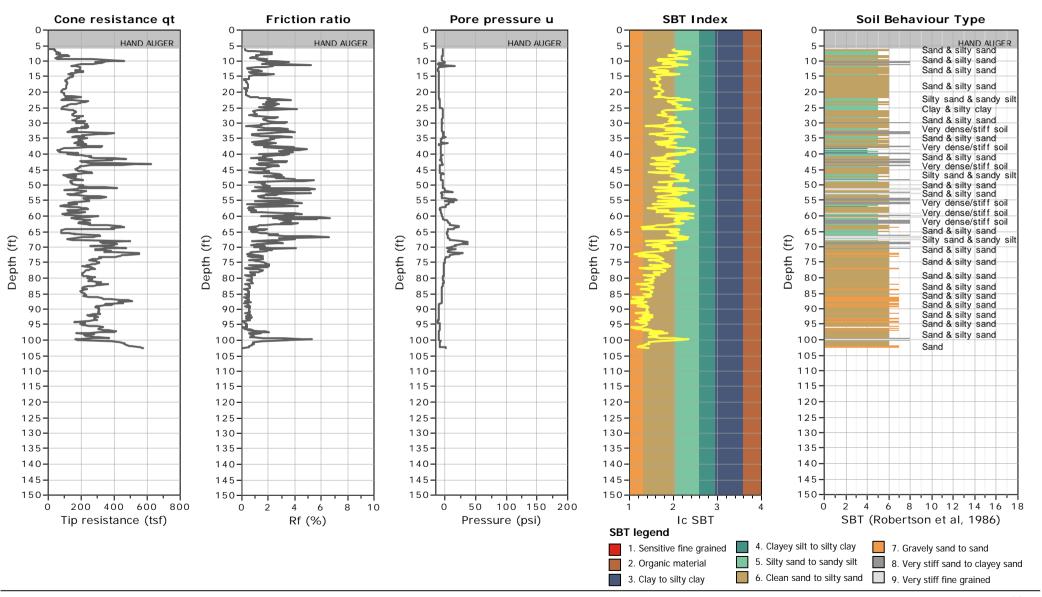




Location: Fresno, CA

Total depth: 102.69 ft Surface Elevation: 288.85 ft

Coords: X:6324548.50, Y:2155038.00



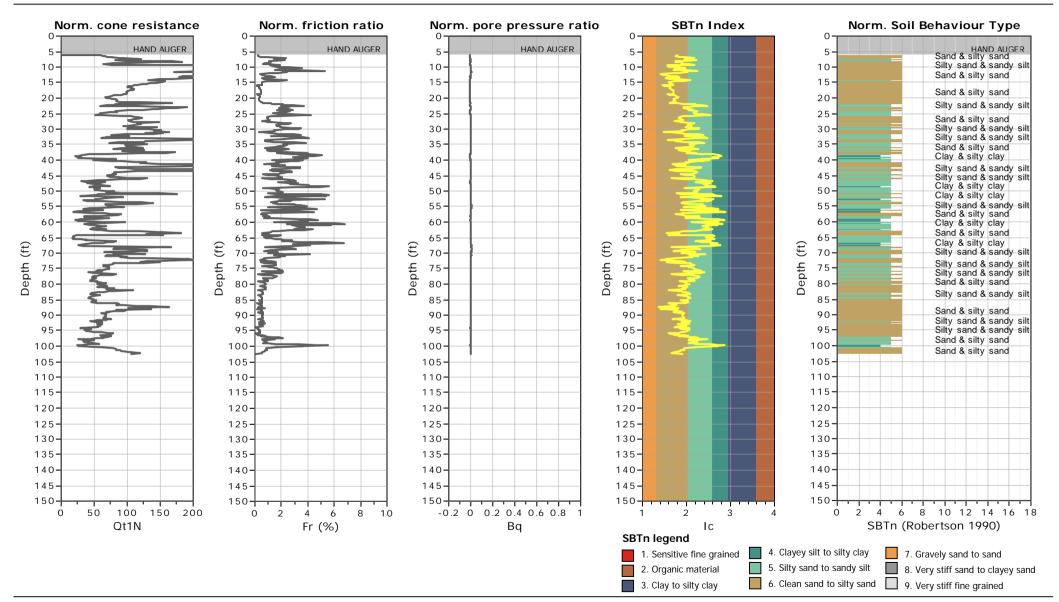


Location: Fresno, CA

Total depth: 102.69 ft

Surface Elevation: 288.85 ft

Coords: X:6324548.50, Y:2155038.00



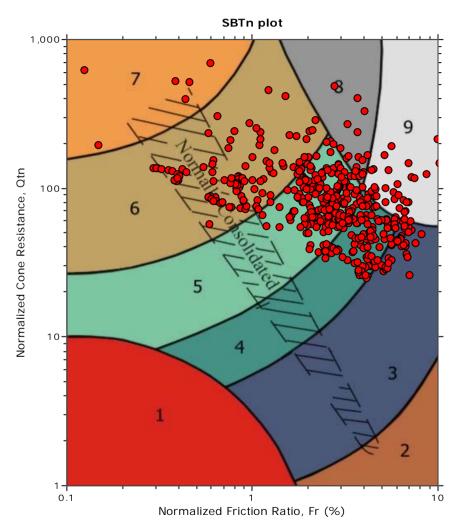


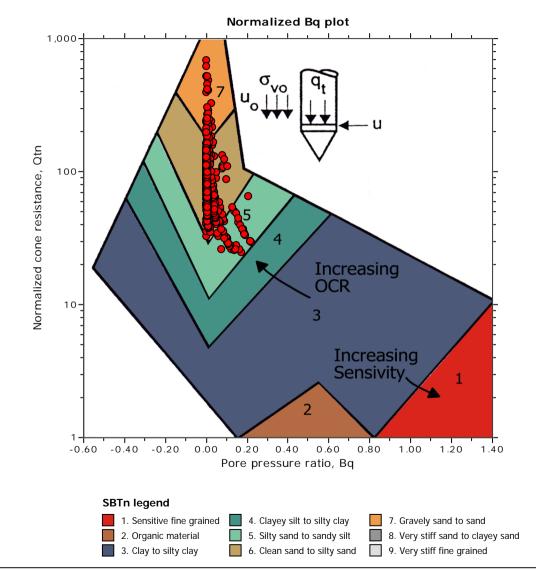
Location: Fresno, CA

Total depth: 101.21 ft Surface Elevation: 285.05 ft

Coords: X:6325407.00, Y:2155267.50

Cone Type: GDC-27 Cone Operator: T.Patterson





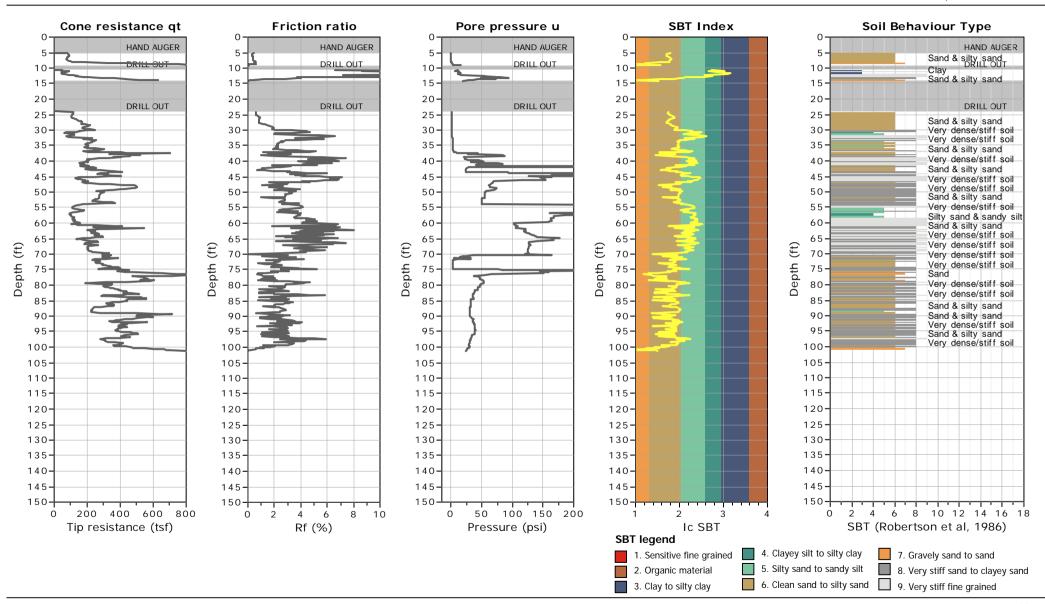


Location: Fresno, CA

Total depth: 101.21 ft Surface Elevation: 285.05 ft

Coords: X:6325407.00, Y:2155267.50

Cone Type: GDC-27
Cone Operator: T.Patterson



Total depth: 101.21 ft

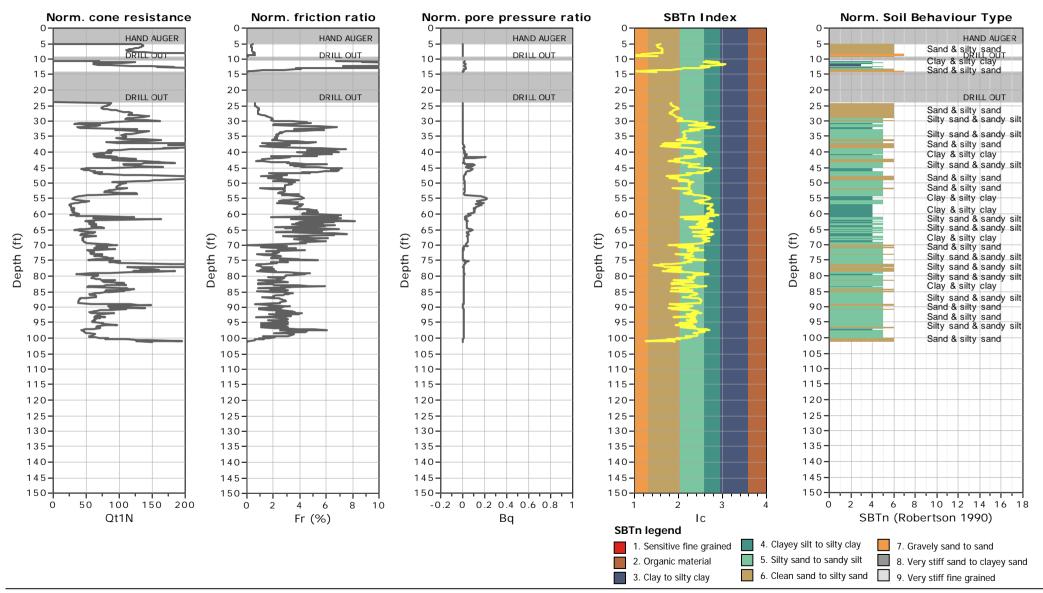


Project: California High-Speed Train

Location: Fresno, CA

Surface Elevation: 285.05 ft Coords: X:6325407.00, Y:2155267.50 Cone Type: GDC-27

Cone Operator: T.Patterson



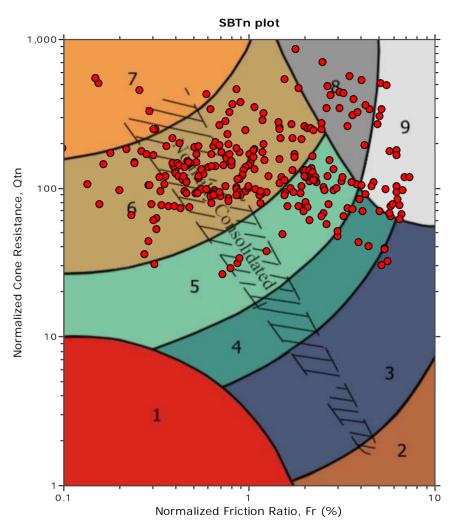


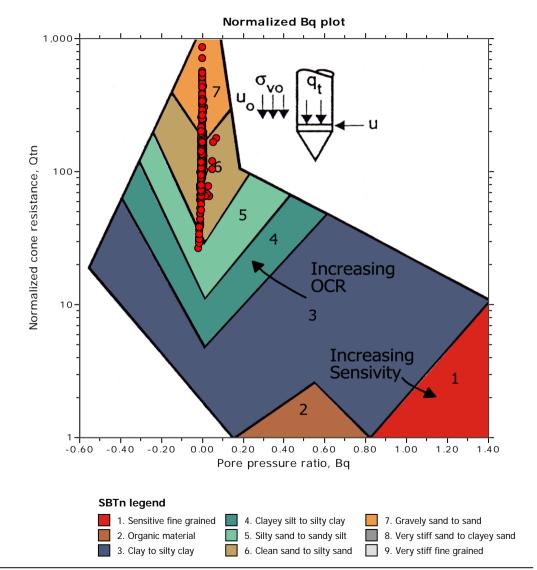
Location: Fresno, CA

Total depth: 52.17 ft Surface Elevation: 287.64 ft

Coords: X:6325494.00, Y:2154687.00

Cone Type: GDC-51
Cone Operator: A.Sancen



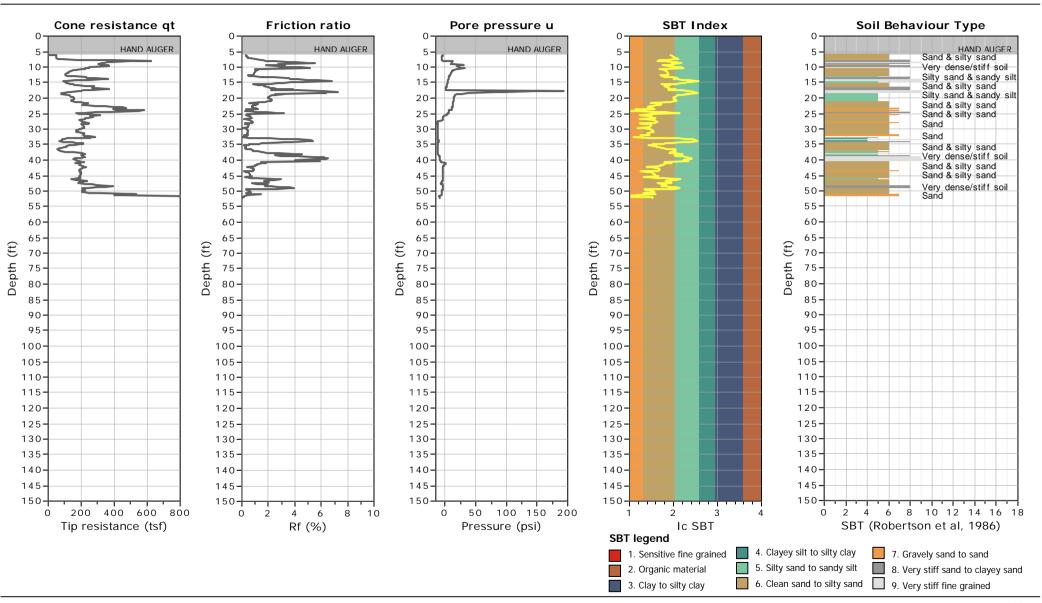




Location: Fresno, CA

Total depth: 52.17 ft Surface Elevation: 287.64 ft

Coords: X:6325494.00, Y:2154687.00

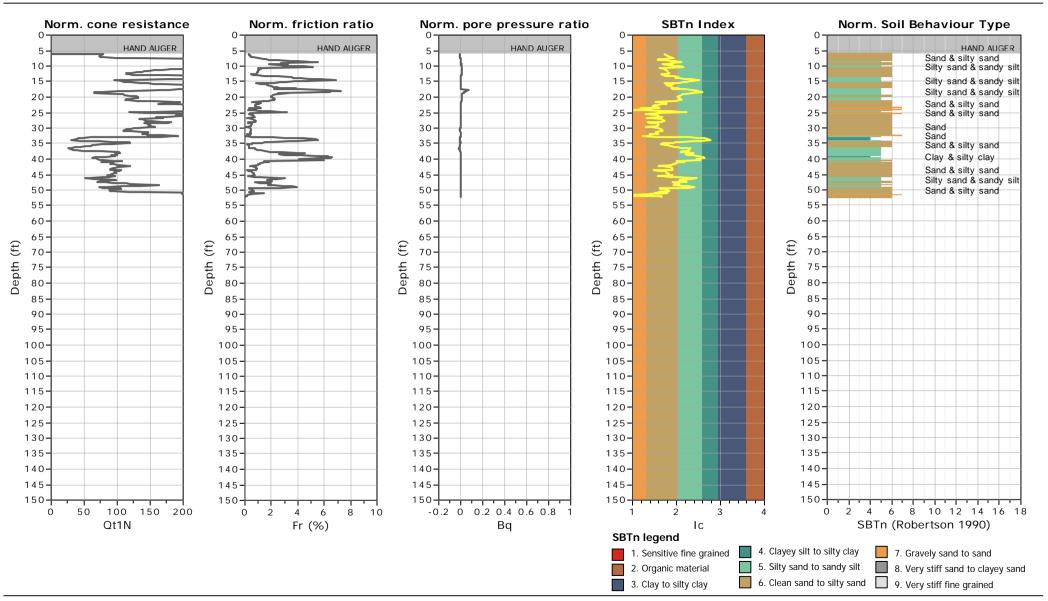




Location: Fresno, CA

Total depth: 52.17 ft Surface Elevation: 287.64 ft

Coords: X:6325494.00, Y:2154687.00



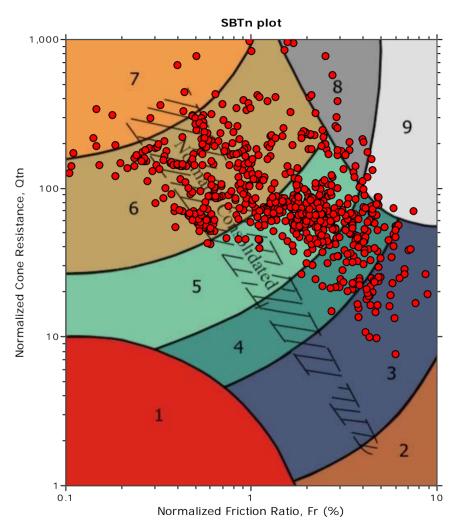


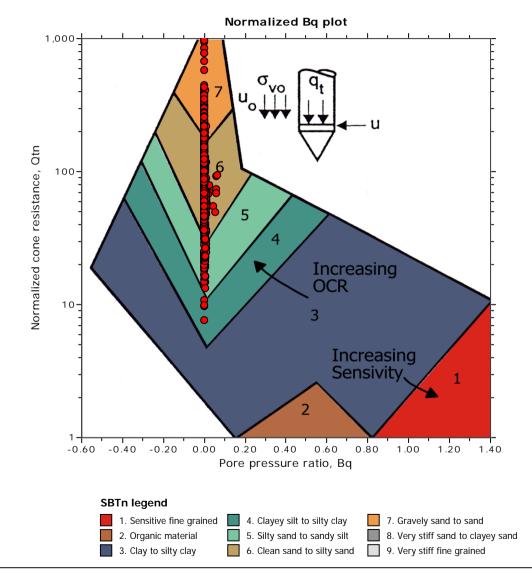
Location: Fresno, CA

Total depth: 114.67 ft Surface Elevation: 286.11 ft

Coords: X:6326261.00, Y:2153498.50

Cone Type: GDC-27
Cone Operator: T.Patterson



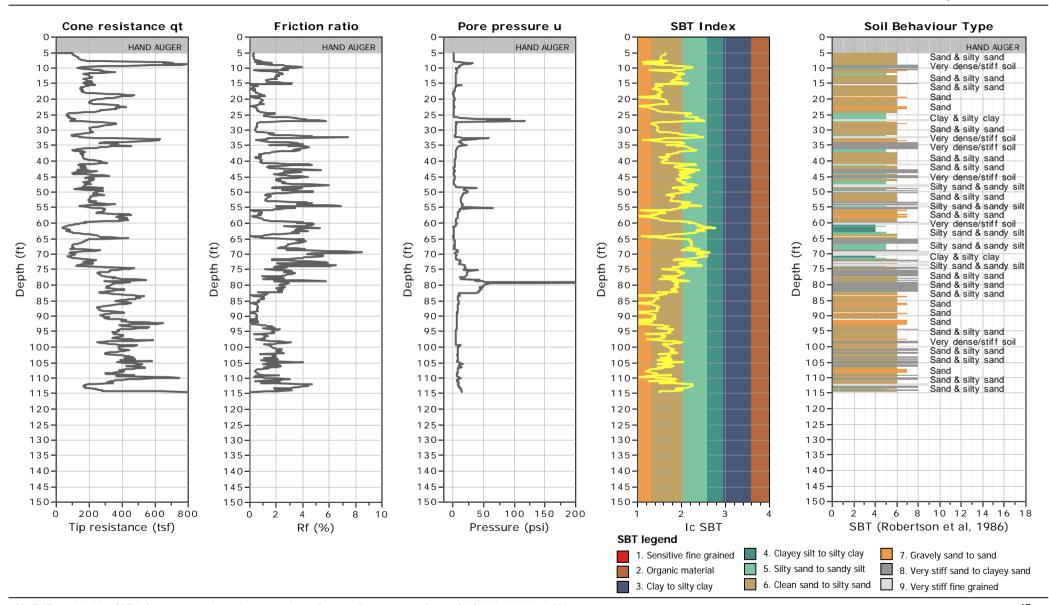




Location: Fresno, CA

Surface Elevation: 286.11 ft Coords: X:6326261.00, Y:2153498.50

Cone Type: GDC-27
Cone Operator: T.Patterson



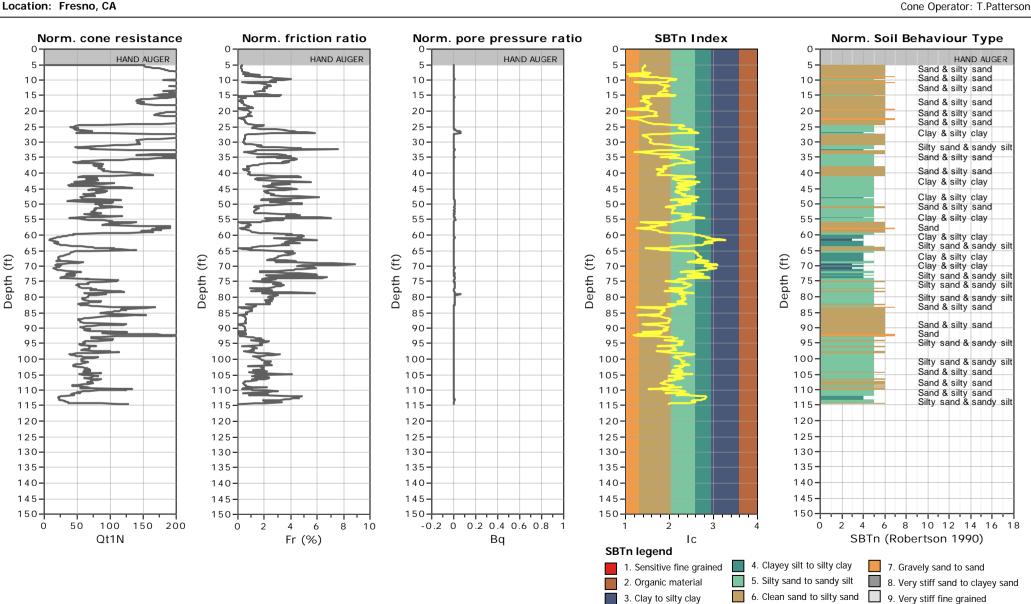


Location: Fresno, CA

Total depth: 114.67 ft Surface Elevation: 286.11 ft

Coords: X:6326261.00, Y:2153498.50

Cone Type: GDC-27



3. Clay to silty clay

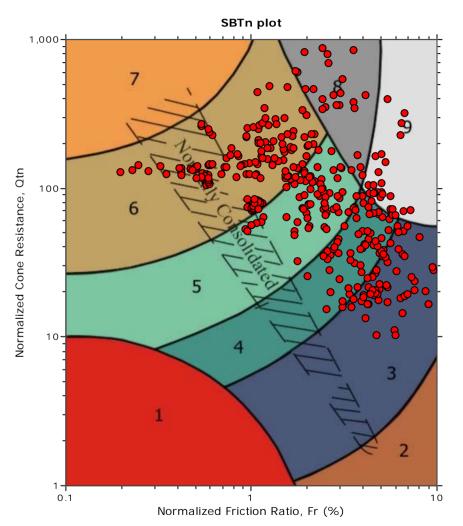


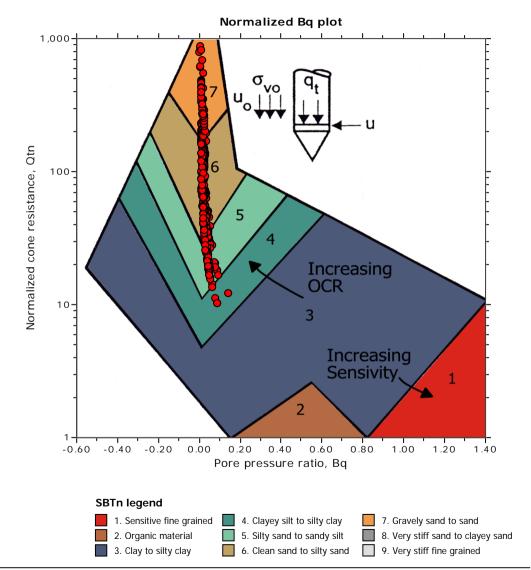
Location: Fresno, CA

Total depth: 67.26 ft Surface Elevation: 285.37 ft

Coords: X:6327476.00, Y:2152082.75

Cone Type: GDC-51
Cone Operator: A.Sancen



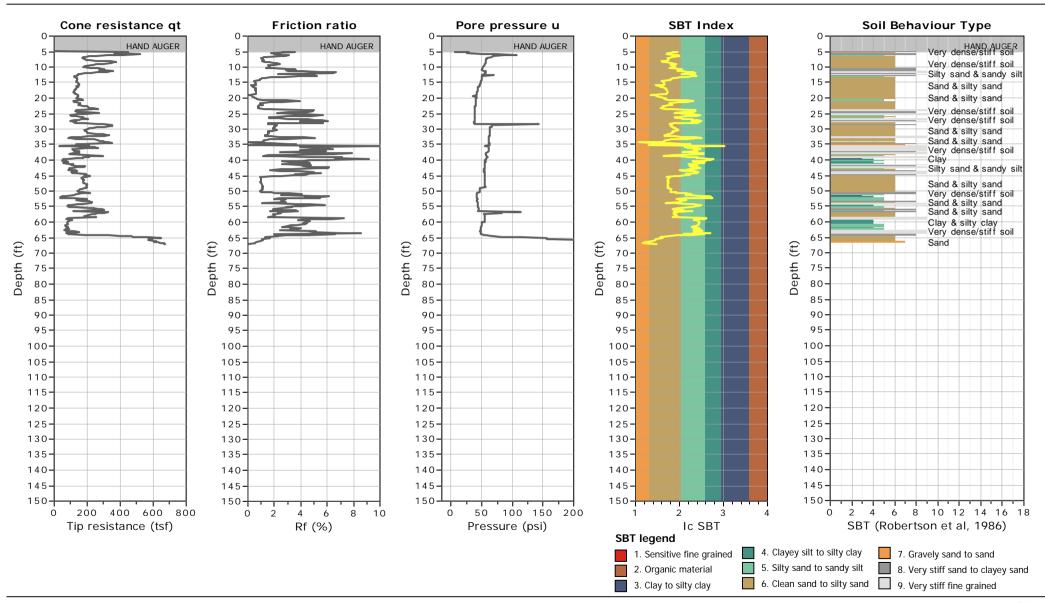




Location: Fresno, CA

Total depth: 67.26 ft Surface Elevation: 285.37 ft

Coords: X:6327476.00, Y:2152082.75



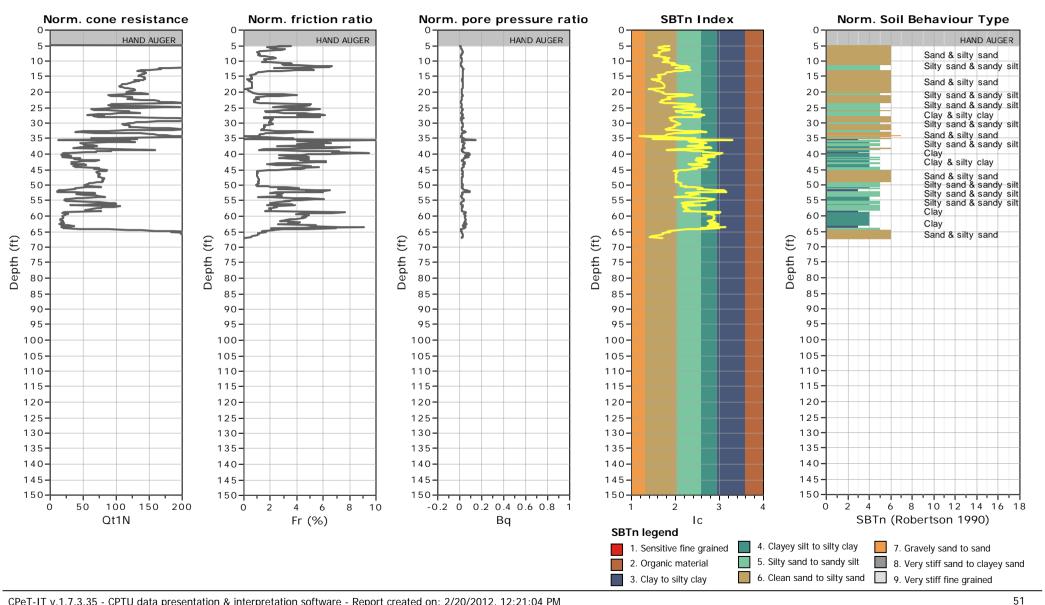
Total depth: 67.26 ft



Project: California High-Speed Train

Location: Fresno, CA

Surface Elevation: 285.37 ft Coords: X:6327476.00, Y:2152082.75



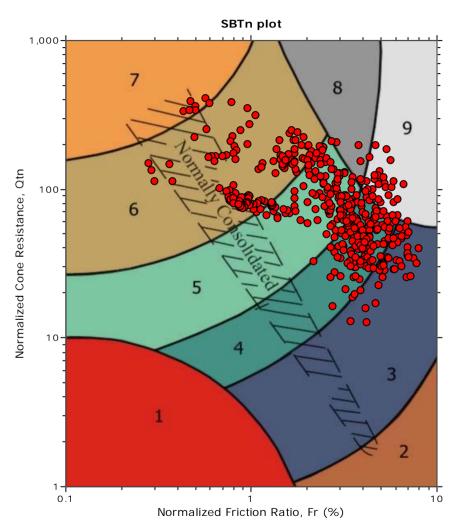


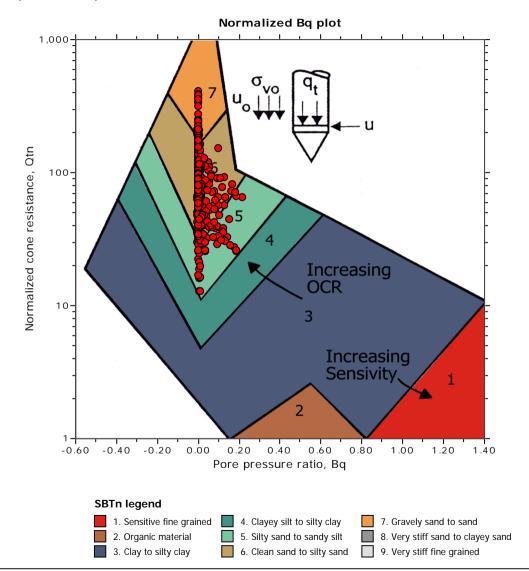
Location: Fresno, CA

Total depth: 80.38 ft

Surface Elevation: 286.31 ft Coords: X:6327731.50, Y:2151787.00

Cone Type: GDC-32 Cone Operator: J.Hancock





Cone Type: GDC-32



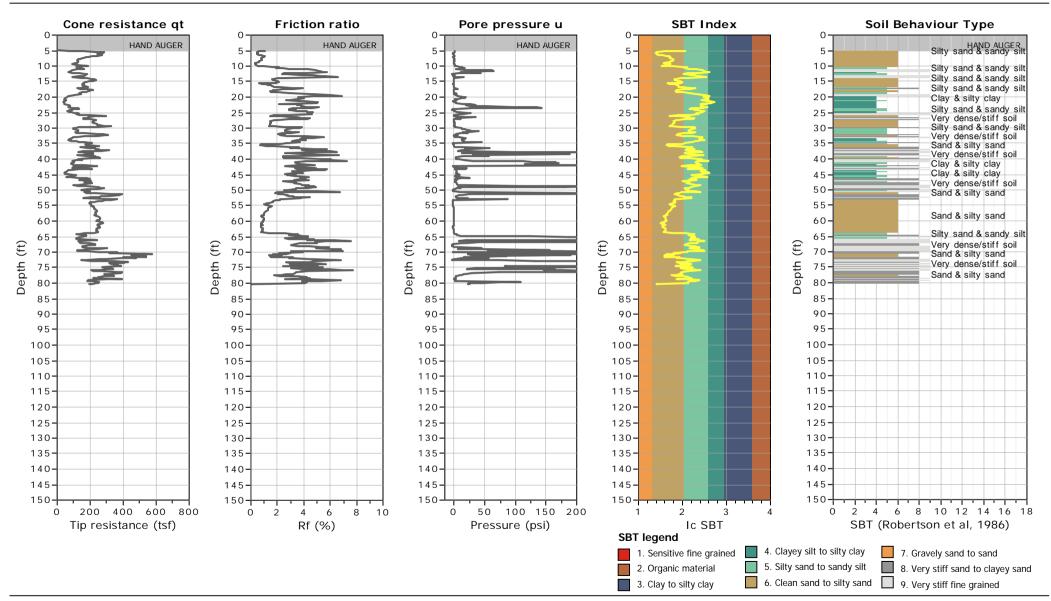
Project: California High-Speed Train

Location: Fresno, CA

Total depth: 80.38 ft Surface Elevation: 286.31 ft

Coords: X:6327731.50, Y:2151787.00

Cone Operator: J.Hancock

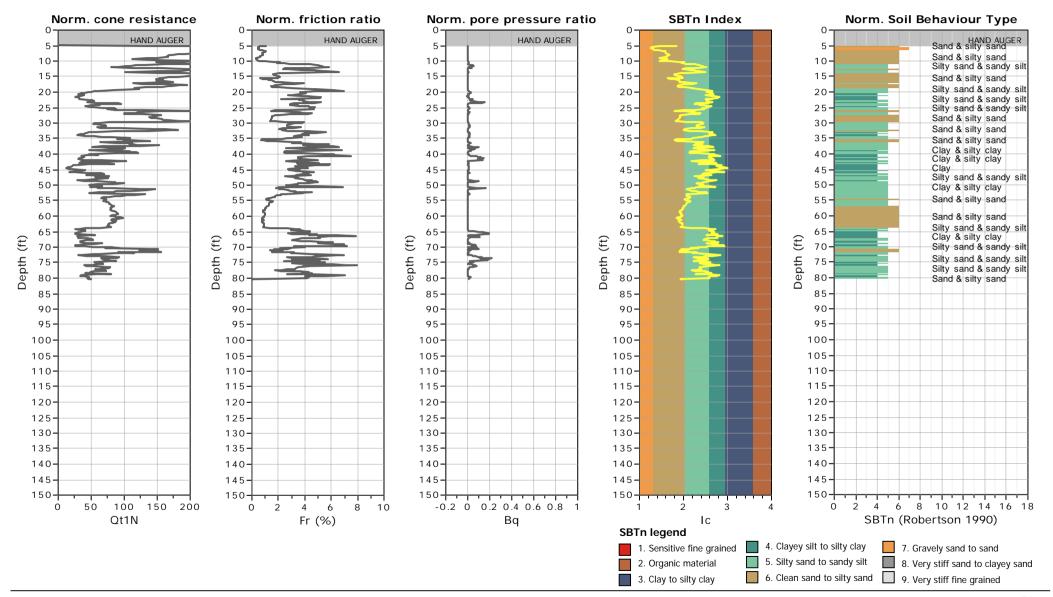


Total depth: 80.38 ft Surface Elevation: 286.31 ft



Location: Fresno, CA

Coords: X:6327731.50, Y:2151787.00 Project: California High-Speed Train Cone Type: GDC-32 Cone Operator: J.Hancock



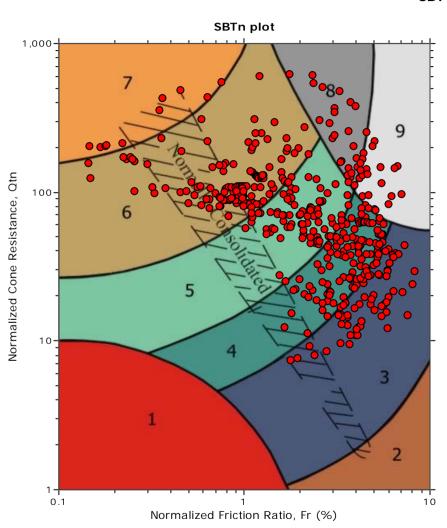
Total depth: 80.38 ft

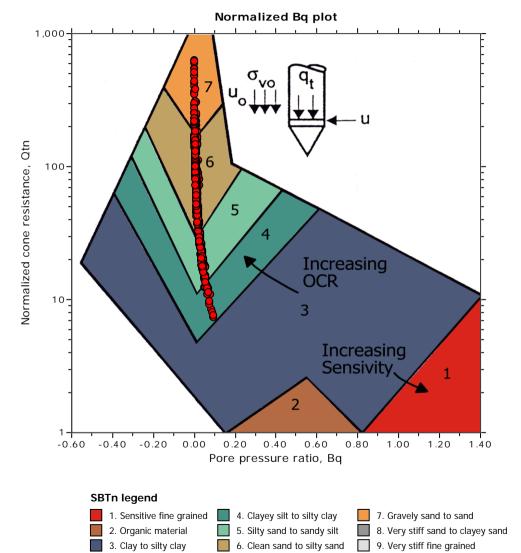
06/29/2012 ADDENDUM 3 - RFP HSR 11-16



Project: California High-Speed Train

Location: Fresno, CA



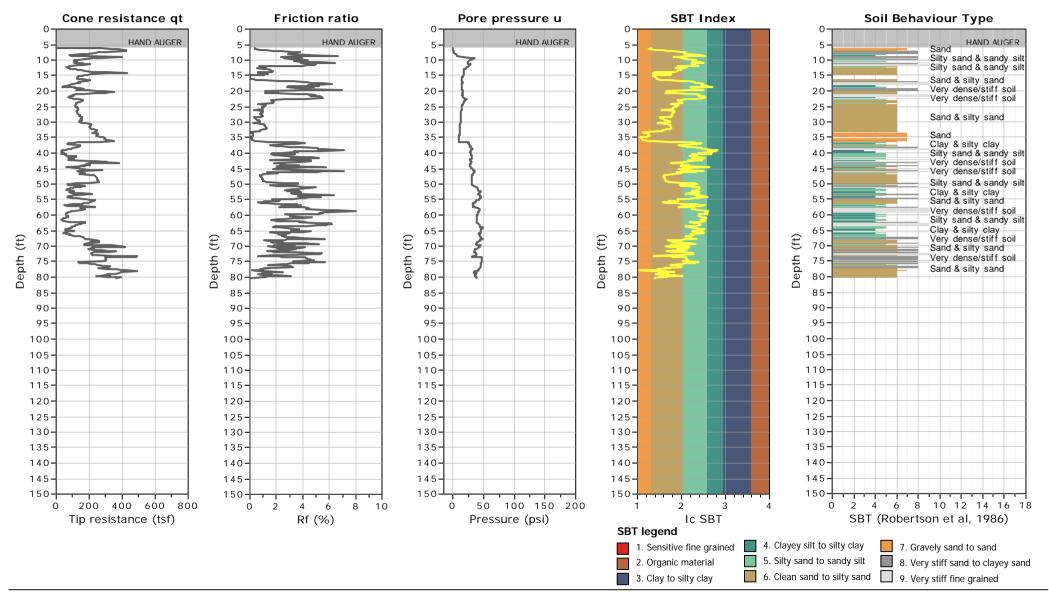


Surface Elevation: 285.99 ft



Location: Fresno, CA

Coords: X:6328346.00, Y:2150921.75 Project: California High-Speed Train Cone Type: GDC-51 Cone Operator: A.Sancen





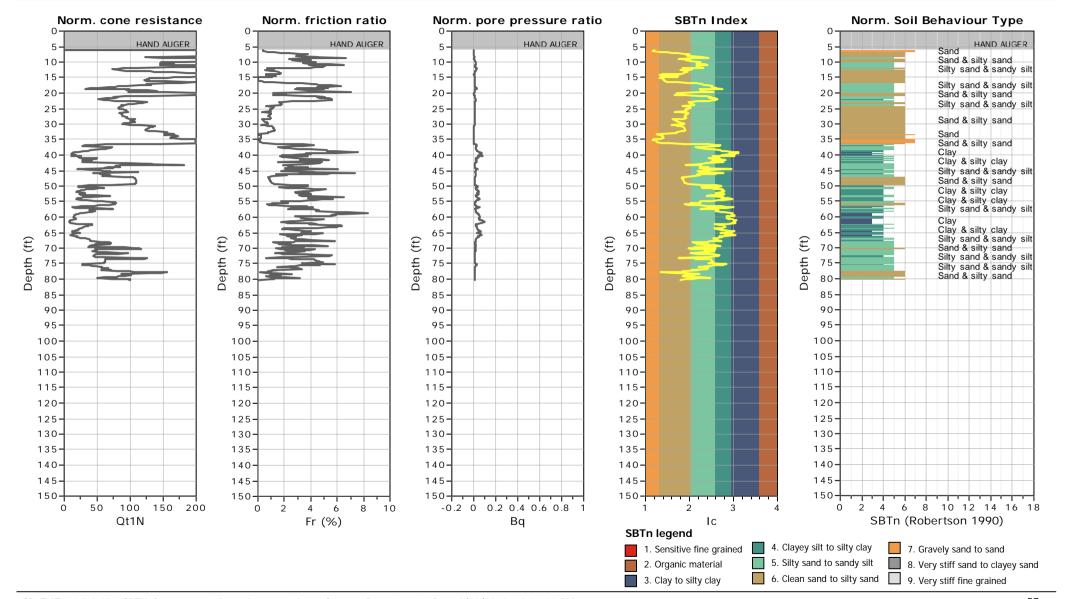
Location: Fresno, CA

Total depth: 80.38 ft

Surface Elevation: 285.99 ft Coords: X:6328346.00, Y:2150921.75

Cone Type: GDC-51

Cone Operator: A.Sancen



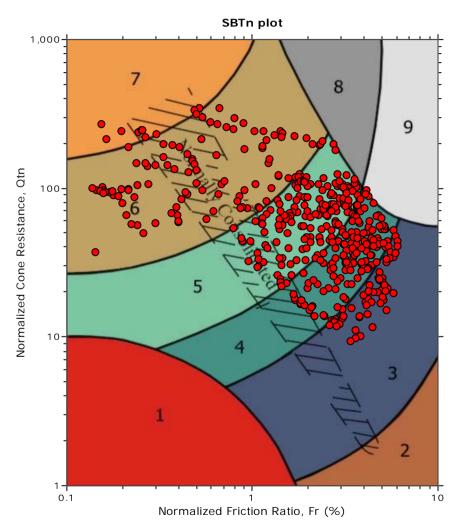


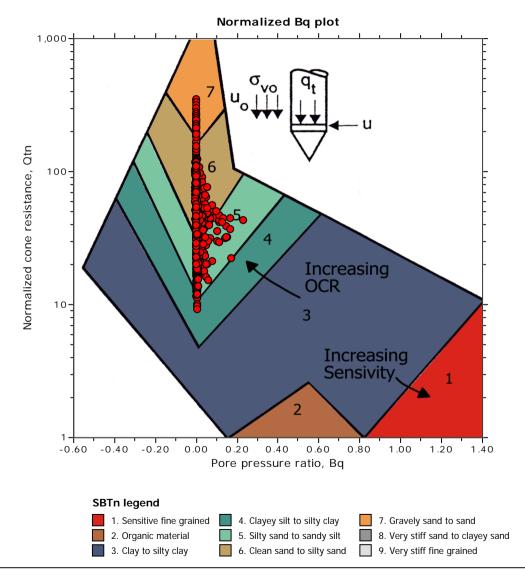
Location: Fresno, CA

Total depth: 81.53 ft Surface Elevation: 289.11 ft

Coords: X:6329493.00, Y:2150638.25

Cone Type: GDC-32 Cone Operator: J.Hancock





Total depth: 81.53 ft

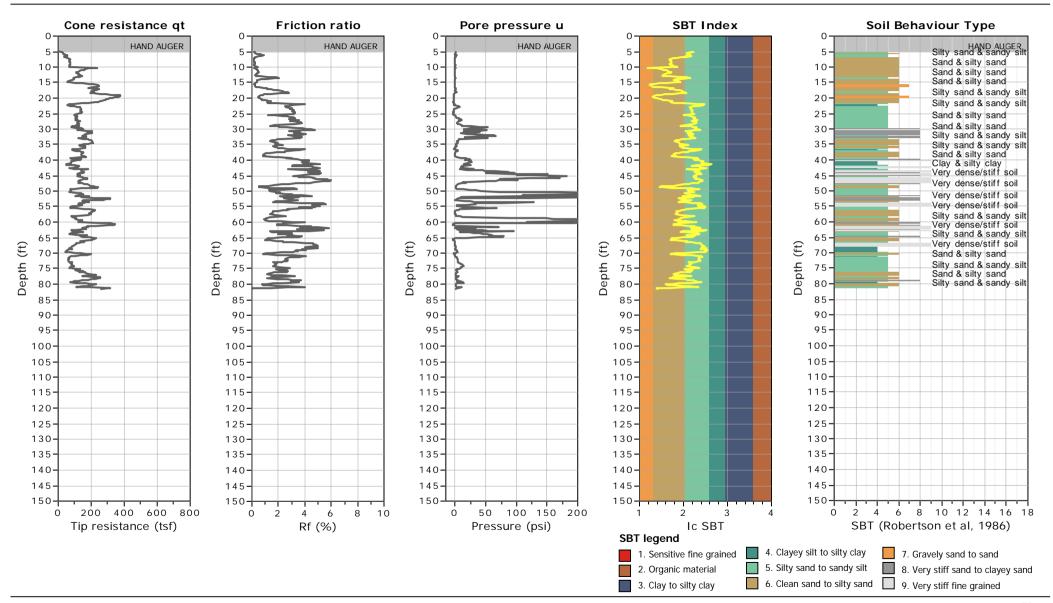


Project: California High-Speed Train

Location: Fresno, CA

Surface Elevation: 289.11 ft Coords: X:6329493.00, Y:2150638.25

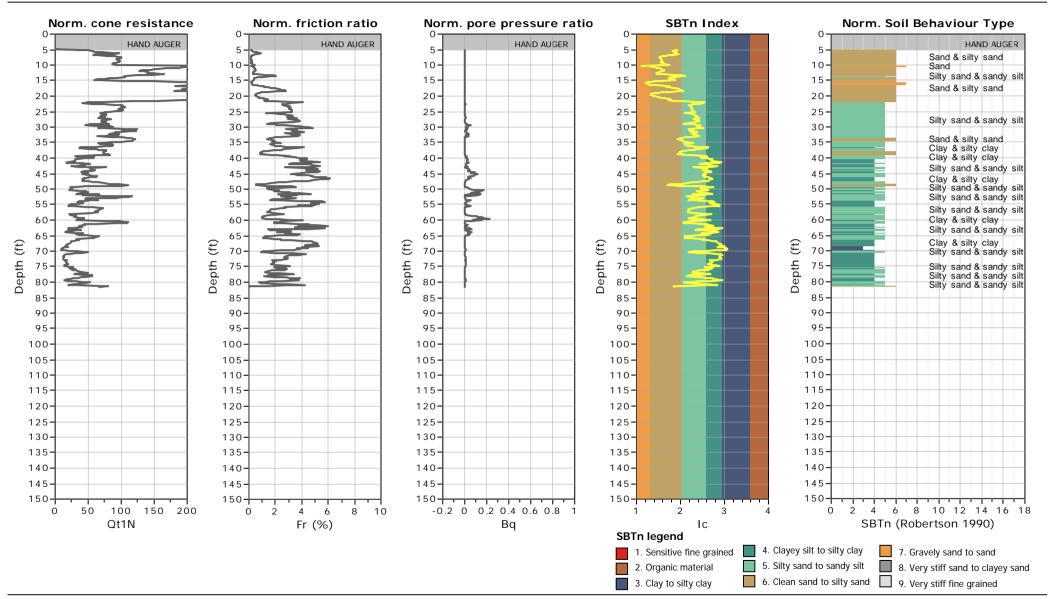
Cone Type: GDC-32 Cone Operator: J.Hancock



Total depth: 81.53 ft Surface Elevation: 289.11 ft



Coords: X:6329493.00, Y:2150638.25 Project: California High-Speed Train Cone Type: GDC-32 Location: Fresno, CA Cone Operator: J.Hancock



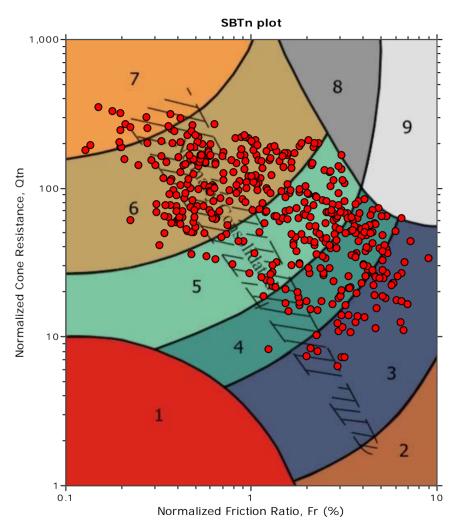


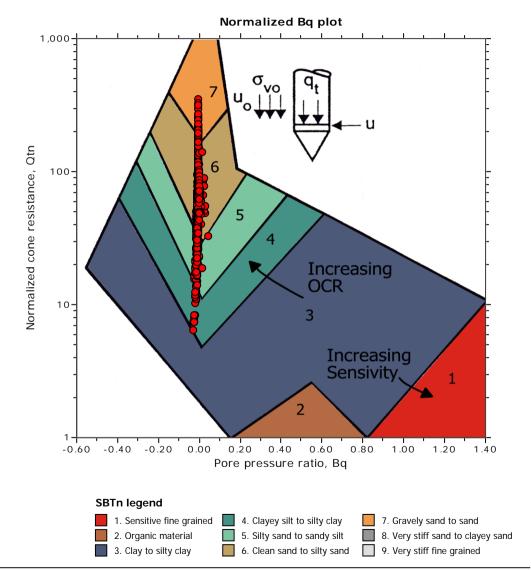
Location: Fresno, CA

Total depth: 80.05 ft Surface Elevation: 288.96 ft

Coords: X:6329144.00, Y:2150348.75

Cone Type: GDC-51
Cone Operator: A.Sancen



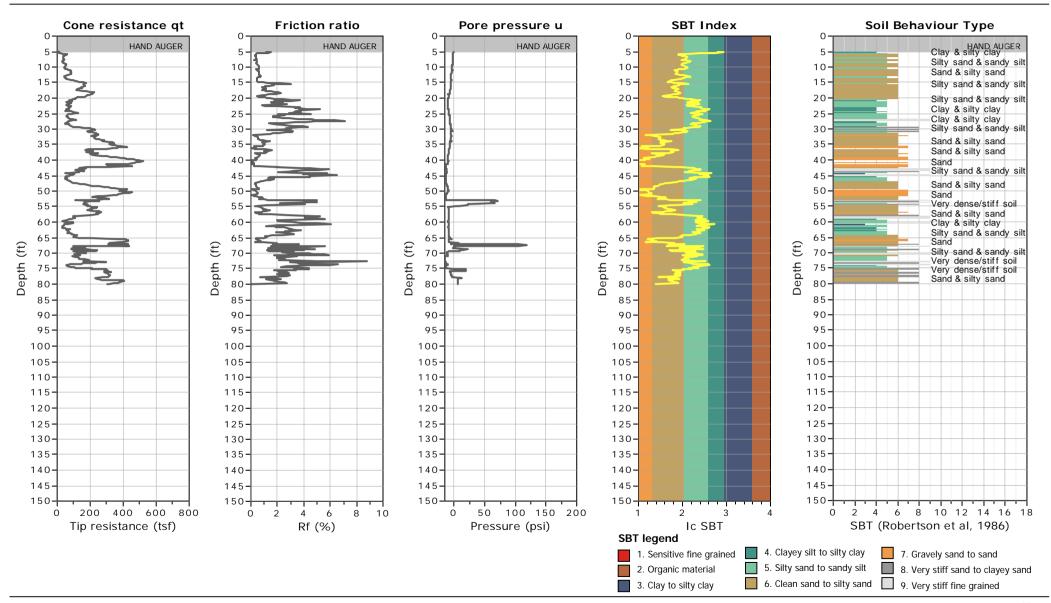




Location: Fresno, CA

Total depth: 80.05 ft Surface Elevation: 288.96 ft

Coords: X:6329144.00, Y:2150348.75

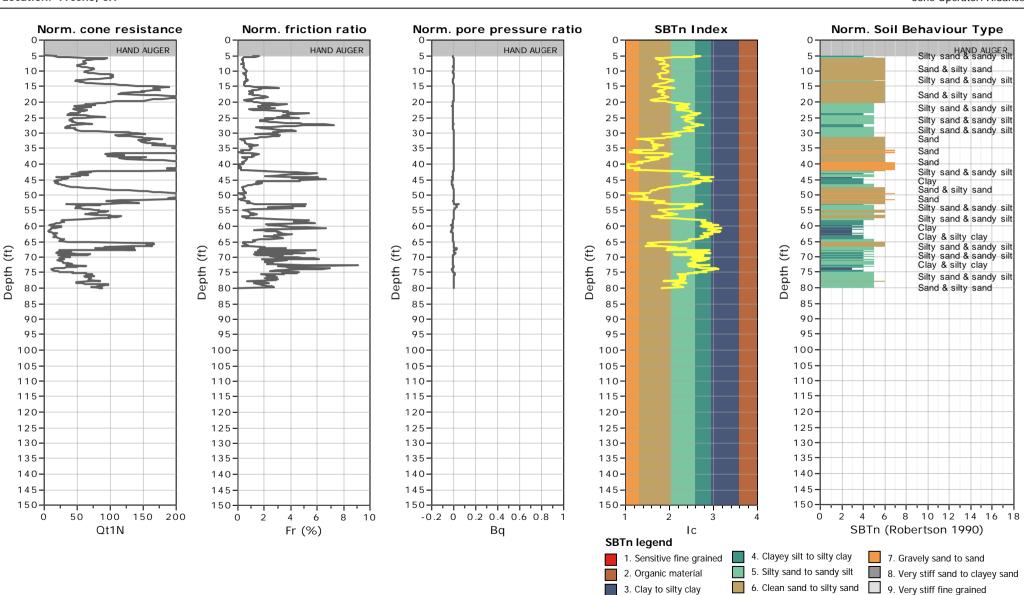




Location: Fresno, CA

Total depth: 80.05 ft

Surface Elevation: 288.96 ft Coords: X:6329144.00, Y:2150348.75



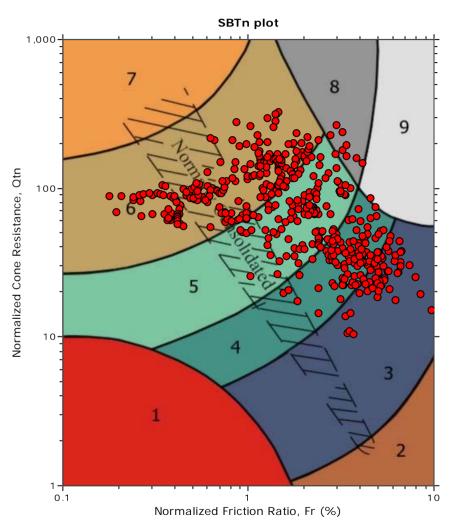


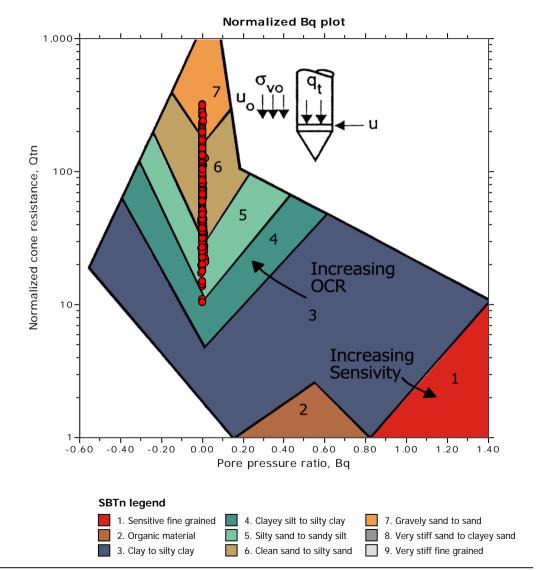
Location: Fresno, CA

Total depth: 80.38 ft Surface Elevation: 292.55 ft

Coords: X:6330415.00, Y:2148901.75

Cone Type: GDC-32
Cone Operator: J.Hancock





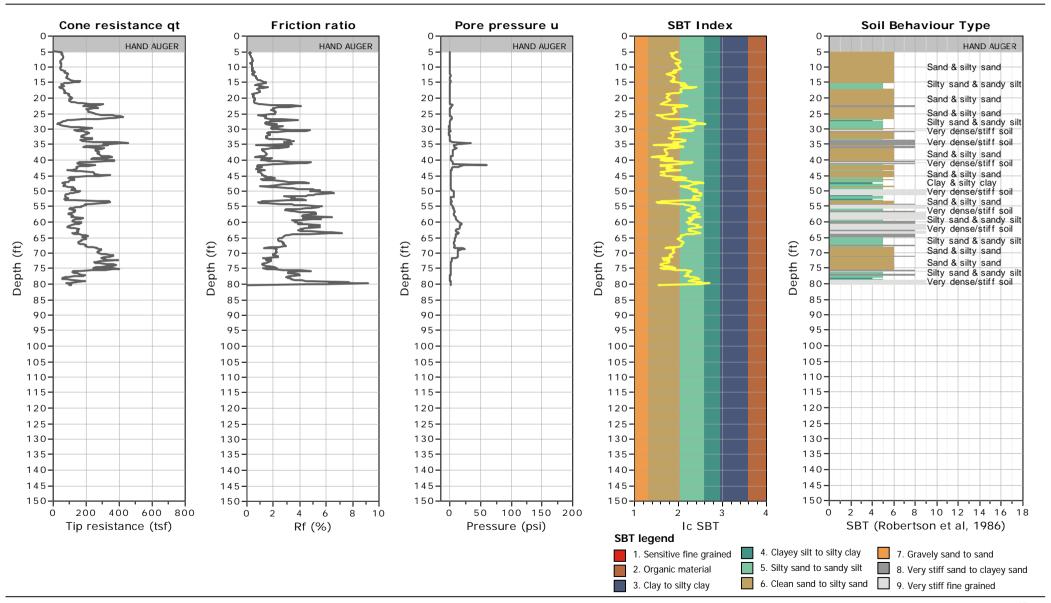


Location: Fresno, CA

Total depth: 80.38 ft Surface Elevation: 292.55 ft

Coords: X:6330415.00, Y:2148901.75

Cone Type: GDC-32 Cone Operator: J.Hancock

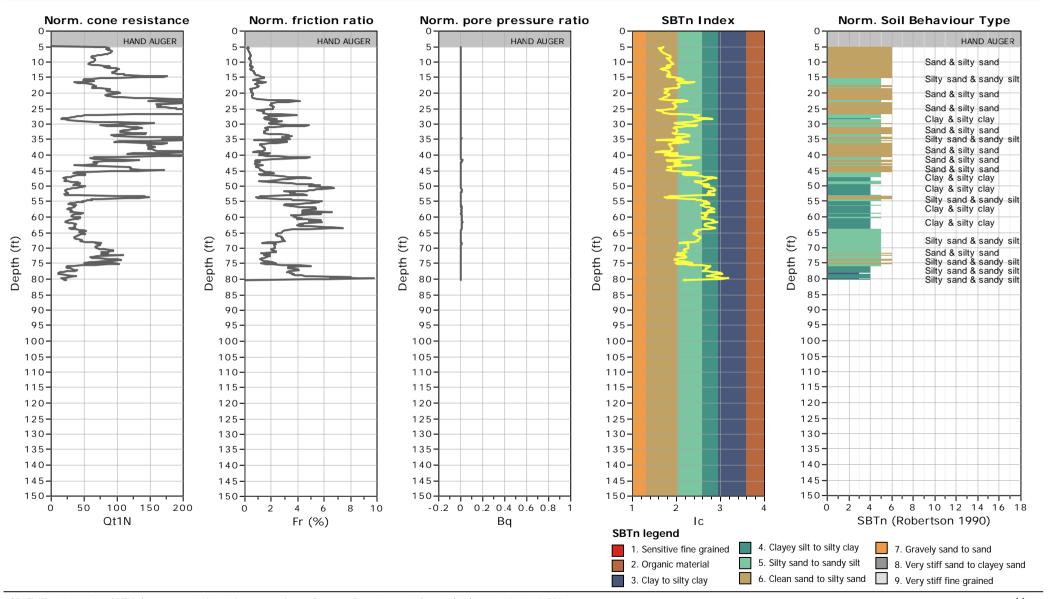




Location: Fresno, CA

Surface Elevation: 292.55 ft Coords: X:6330415.00, Y:2148901.75

> Cone Type: GDC-32 Cone Operator: J.Hancock



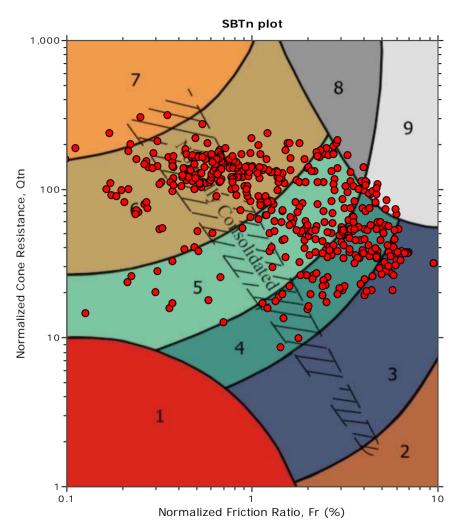


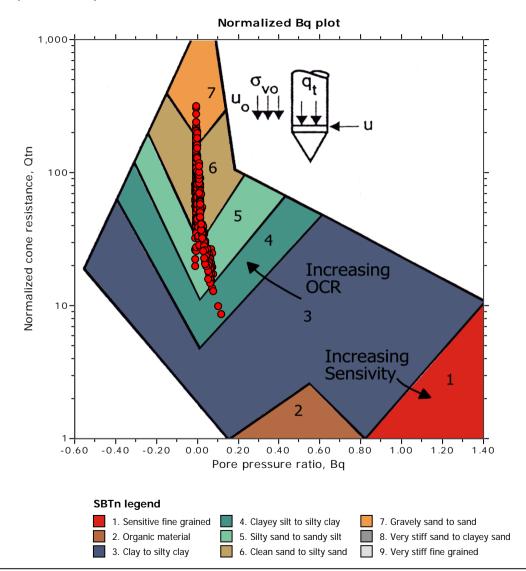
Location: Fresno, CA

Total depth: 80.05 ft Surface Elevation: 293.04 ft

Coords: X:6330712.00, Y:2149159.25

Cone Type: GDC-51
Cone Operator: A.Sancen



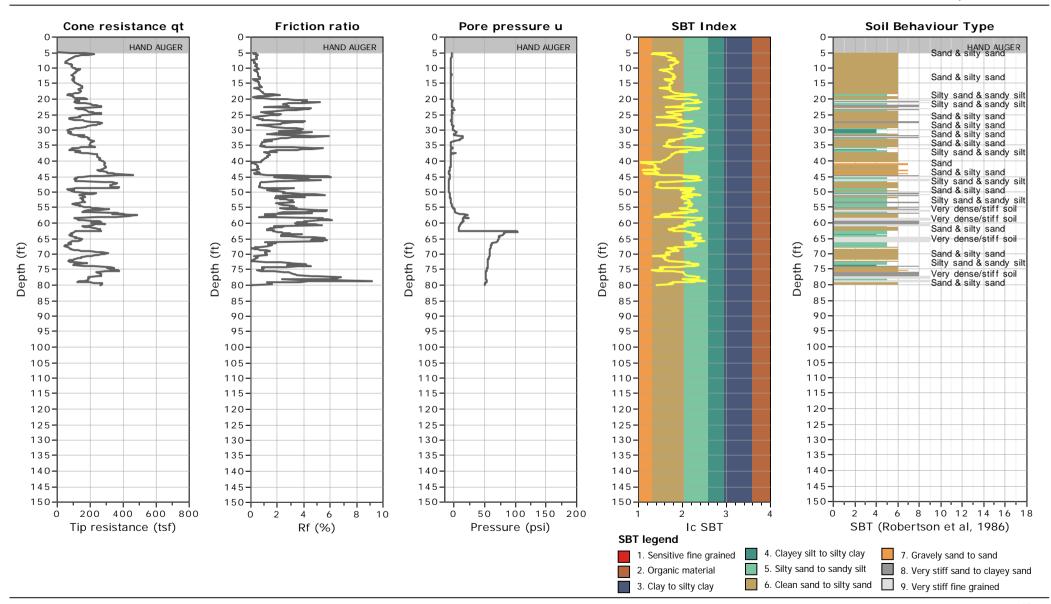




Location: Fresno, CA

Total depth: 80.05 ft Surface Elevation: 293.04 ft

Coords: X:6330712.00, Y:2149159.25

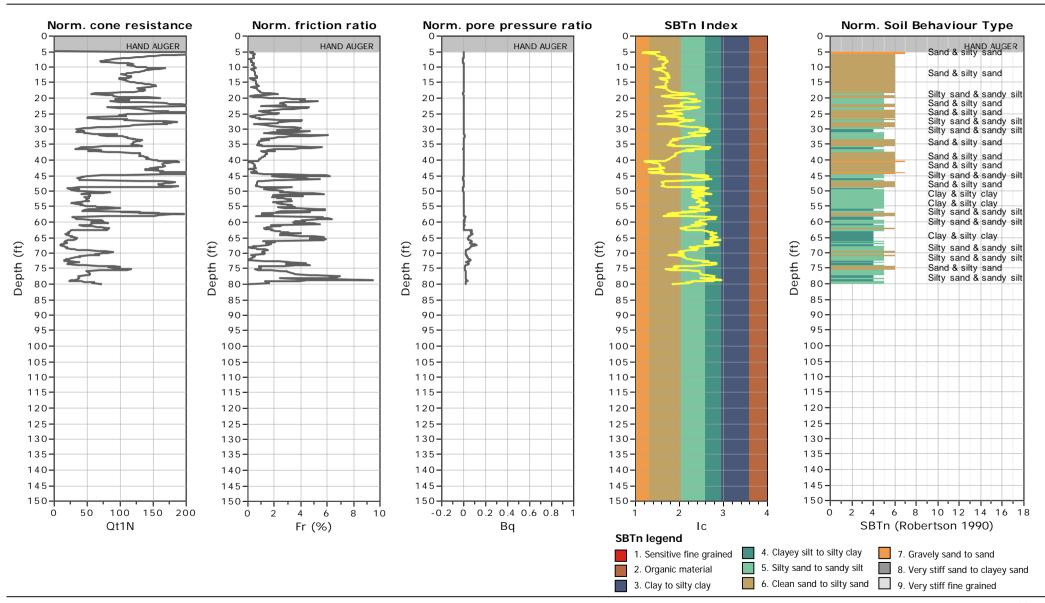




Location: Fresno, CA

Total depth: 80.05 ft Surface Elevation: 293.04 ft

Coords: X:6330712.00, Y:2149159.25



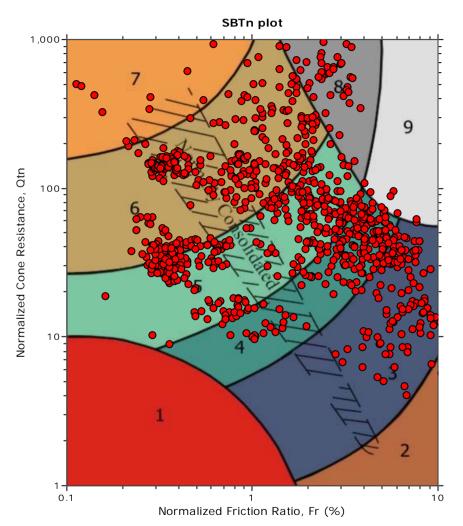


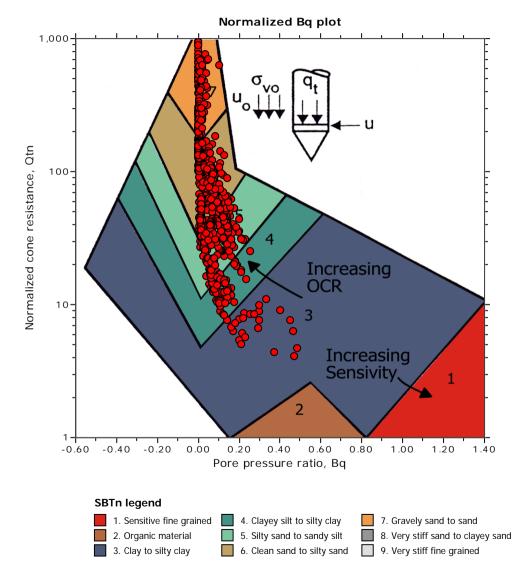
Location: Fresno, CA

Total depth: 150.59 ft Surface Elevation: 284.97 ft

Coords: X:6331231.00, Y:2147685.75

Cone Type: GDC-32
Cone Operator: J.Hancock





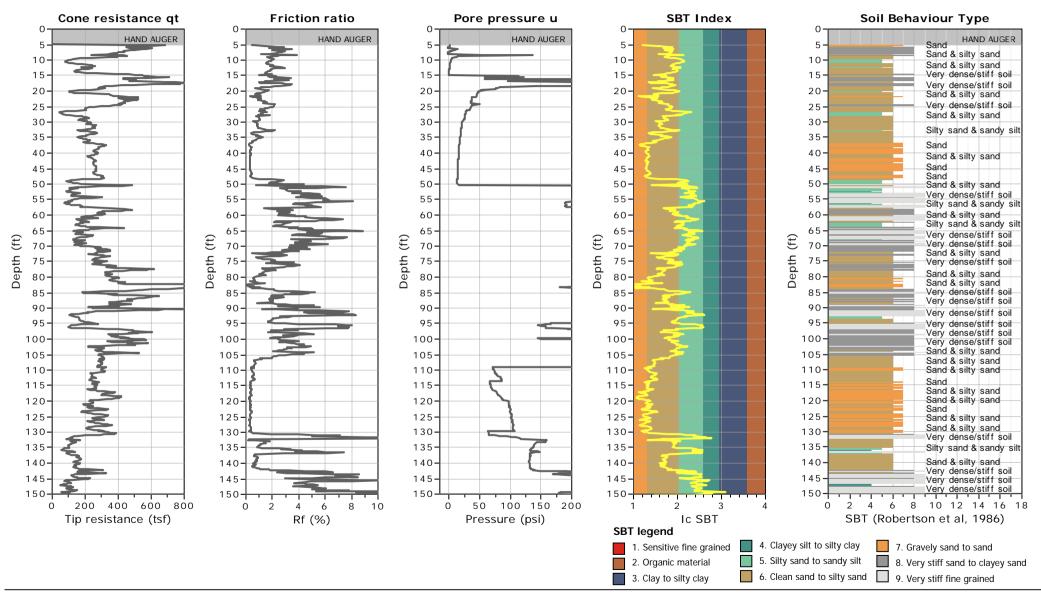


Location: Fresno, CA

Total depth: 150.59 ft Surface Elevation: 284.97 ft

Coords: X:6331231.00, Y:2147685.75

Cone Type: GDC-32 Cone Operator: J.Hancock



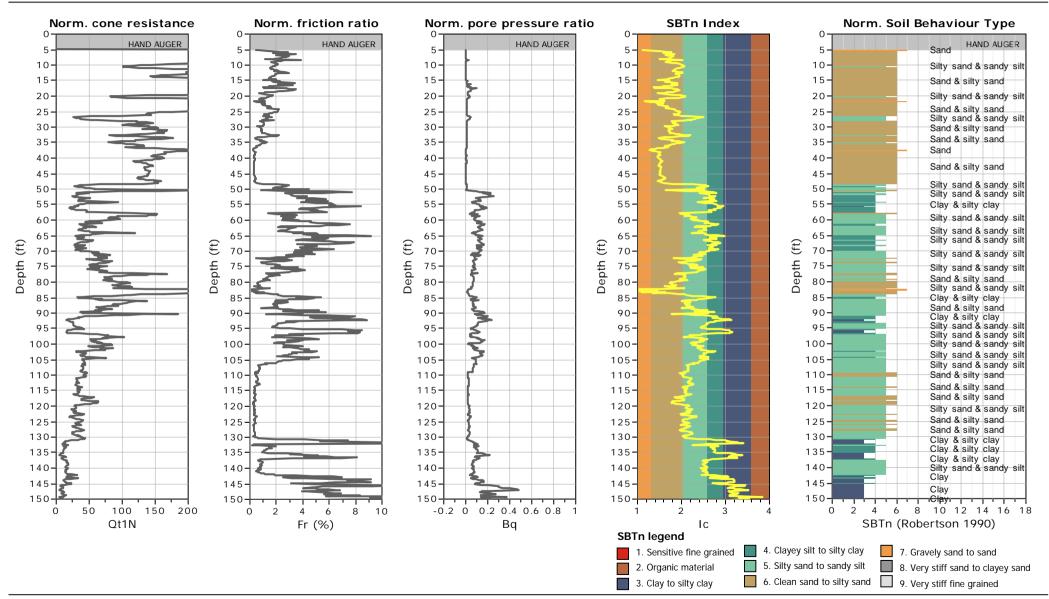


Location: Fresno, CA

Total depth: 150.59 ft Surface Elevation: 284.97 ft

Coords: X:6331231.00, Y:2147685.75

Cone Type: GDC-32 Cone Operator: J.Hancock



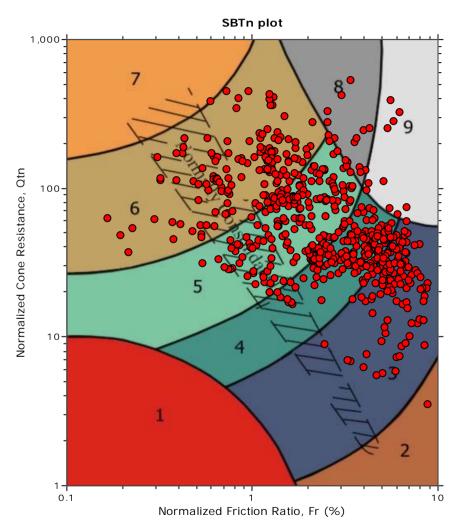


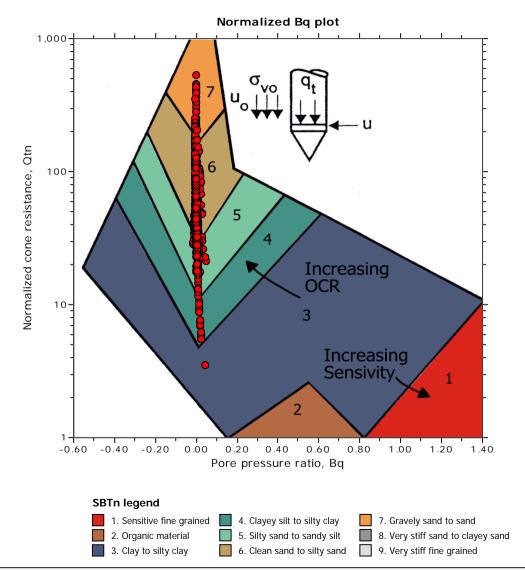
Location: Fresno, CA

Total depth: 103.84 ft Surface Elevation: 285.13 ft

Coords: X:6331888.50, Y:2146941.75

Cone Type: GDC-51
Cone Operator: A.Sancen



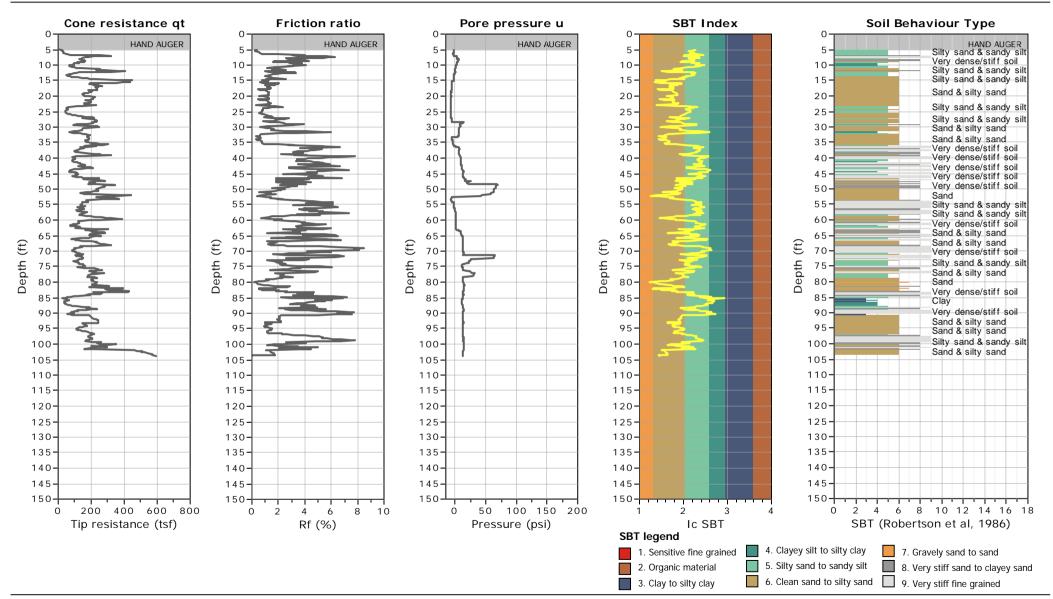




Location: Fresno, CA

Total depth: 103.84 ft Surface Elevation: 285.13 ft

Coords: X:6331888.50, Y:2146941.75

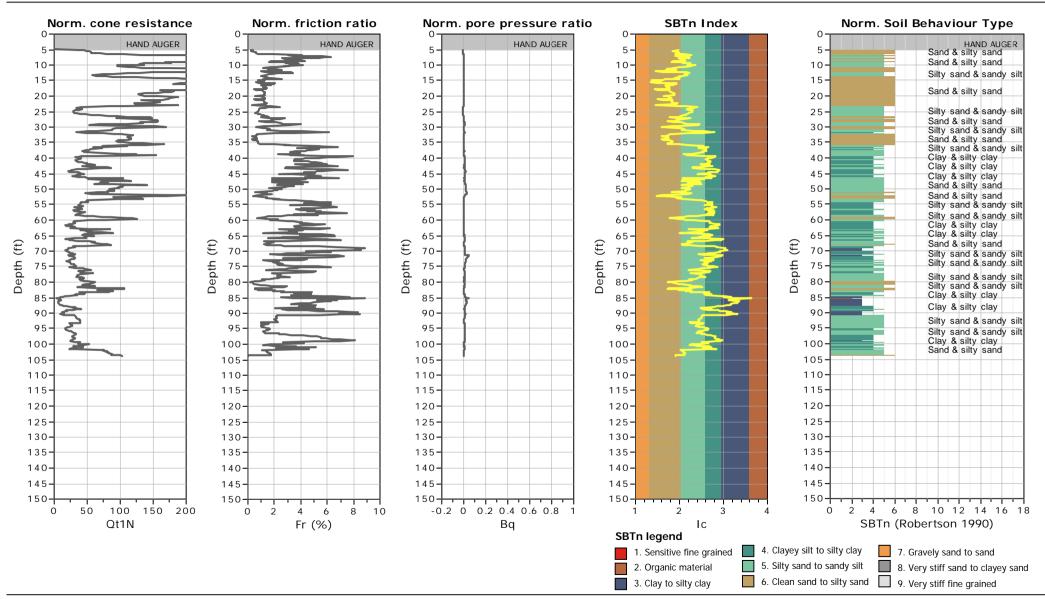




Location: Fresno, CA

Total depth: 103.84 ft Surface Elevation: 285.13 ft

Coords: X:6331888.50, Y:2146941.75



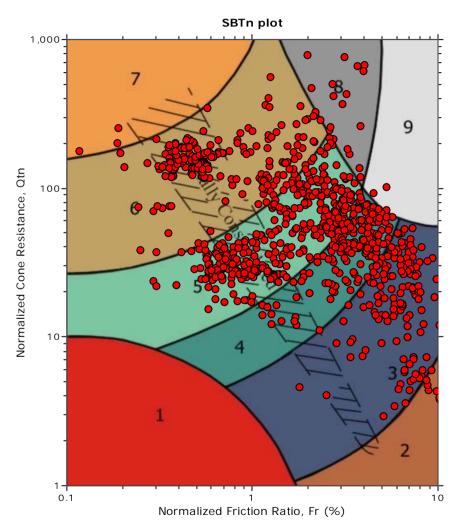


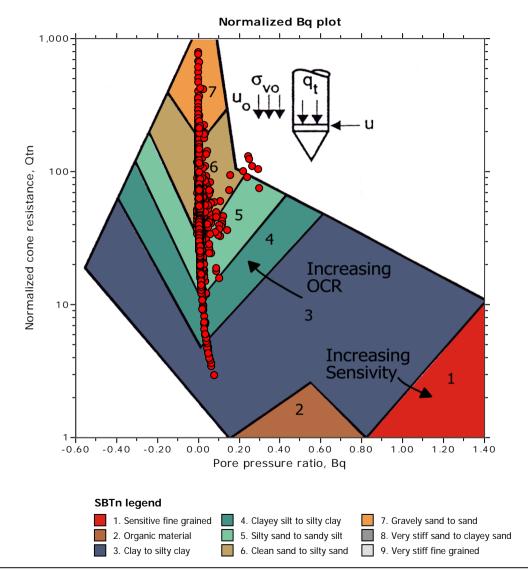
Location: Fresno, CA

Total depth: 150.59 ft Surface Elevation: 284.71 ft

Coords: X:6331320.00, Y:2147581.50

Cone Type: GDC-32
Cone Operator: J.Hancock





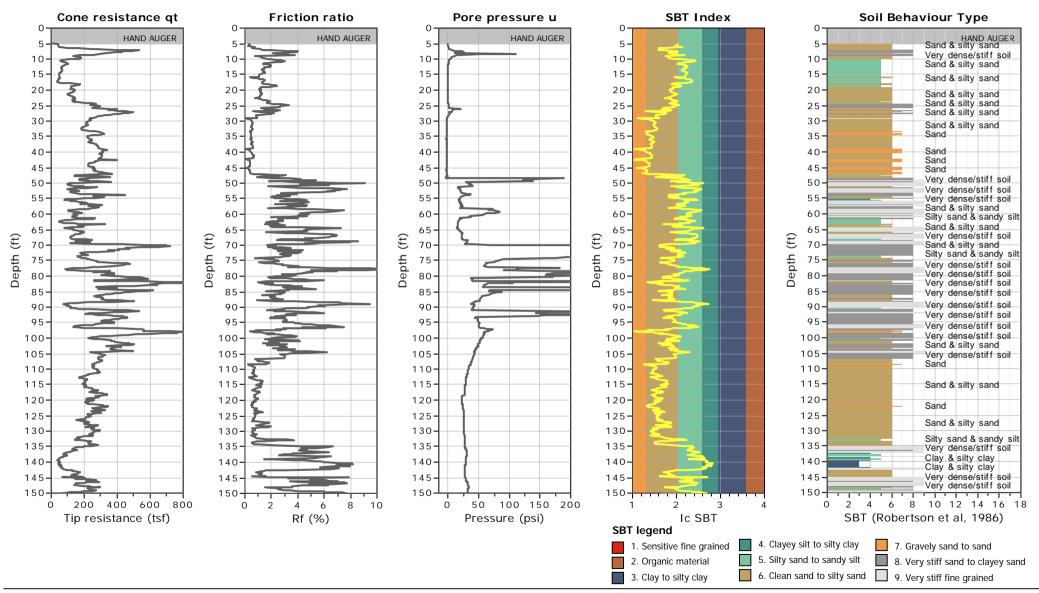


Location: Fresno, CA

Total depth: 150.59 ft Surface Elevation: 284.71 ft

Coords: X:6331320.00, Y:2147581.50

Cone Type: GDC-32 Cone Operator: J.Hancock



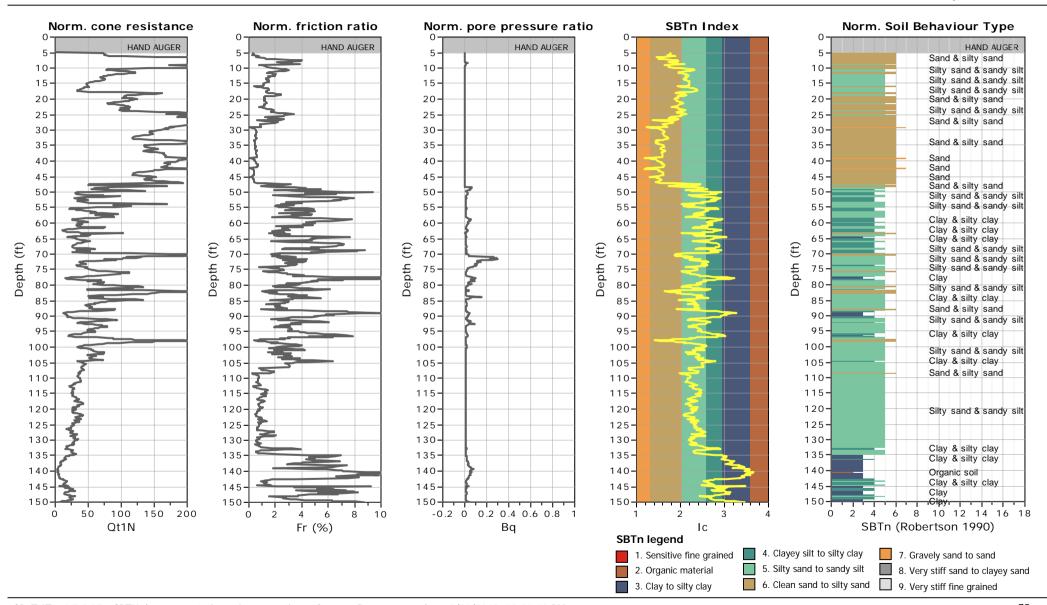


Location: Fresno, CA

Total depth: 150.59 ft Surface Elevation: 284.71 ft

Coords: X:6331320.00, Y:2147581.50

Cone Type: GDC-32 Cone Operator: J.Hancock



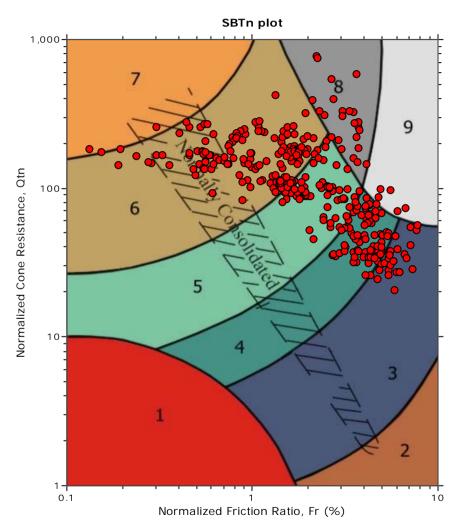


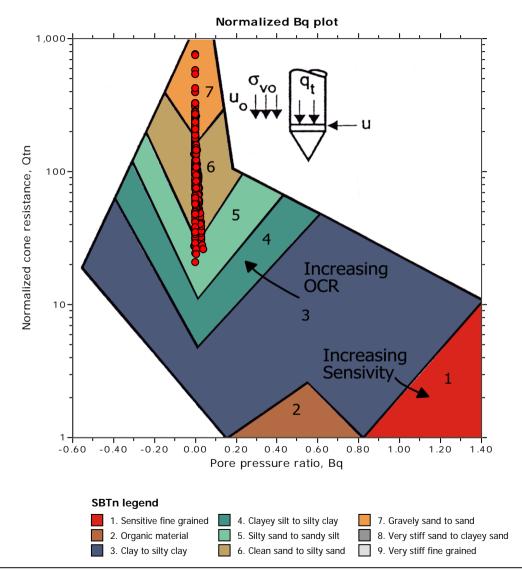
Location: Fresno, CA

Total depth: 63.98 ft Surface Elevation: 283.79 ft

Coords: X:6333046.50, Y:2145957.75

Cone Type: GDC-51
Cone Operator: A.Sancen





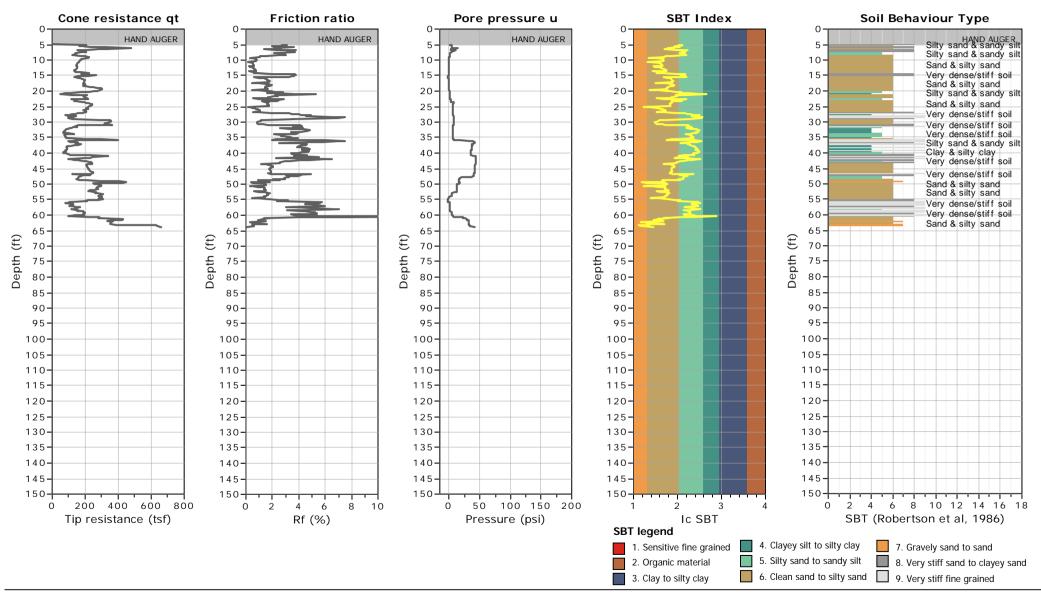


Location: Fresno, CA

Total depth: 63.98 ft

Surface Elevation: 283.79 ft

Coords: X:6333046.50, Y:2145957.75





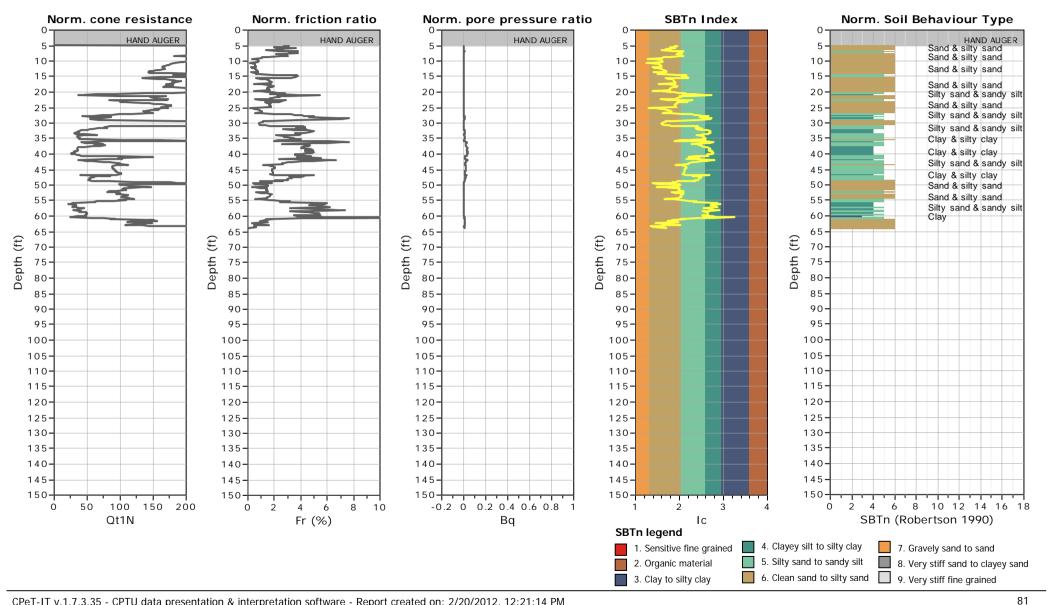
Location: Fresno, CA

Total depth: 63.98 ft

Surface Elevation: 283.79 ft Coords: X:6333046.50, Y:2145957.75

Cone Type: GDC-51

Cone Operator: A.Sancen



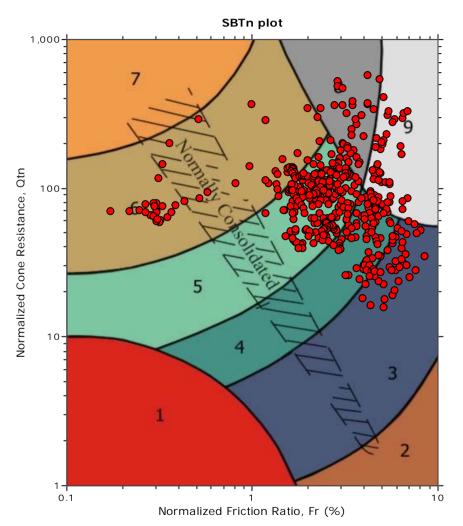


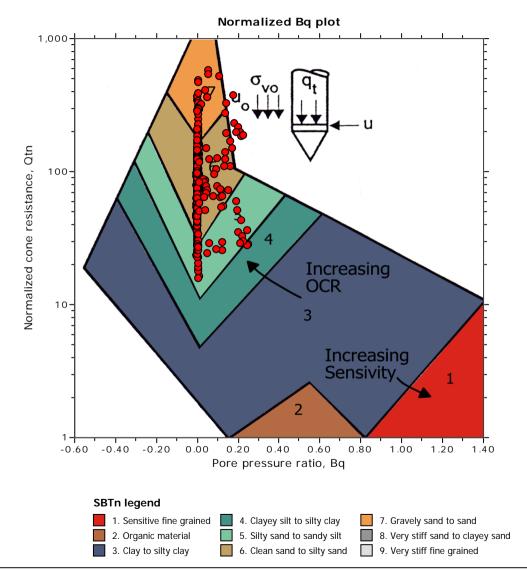
Location: Fresno, CA

Total depth: 80.38 ft Surface Elevation: 286.63 ft

Coords: X:6335169.00, Y:2144137.50

Cone Type: GDC-32
Cone Operator: J.Hancock





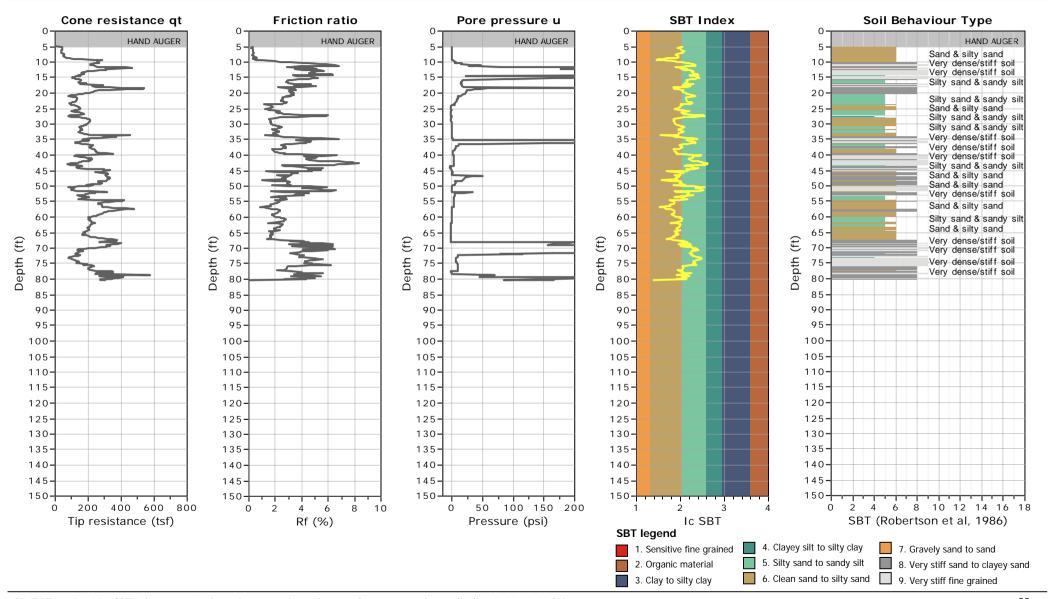


Location: Fresno, CA

Coords: X:6335169.00, Y:2144137.50 Cone Type: GDC-32

Cone Operator: J.Hancock

Surface Elevation: 286.63 ft



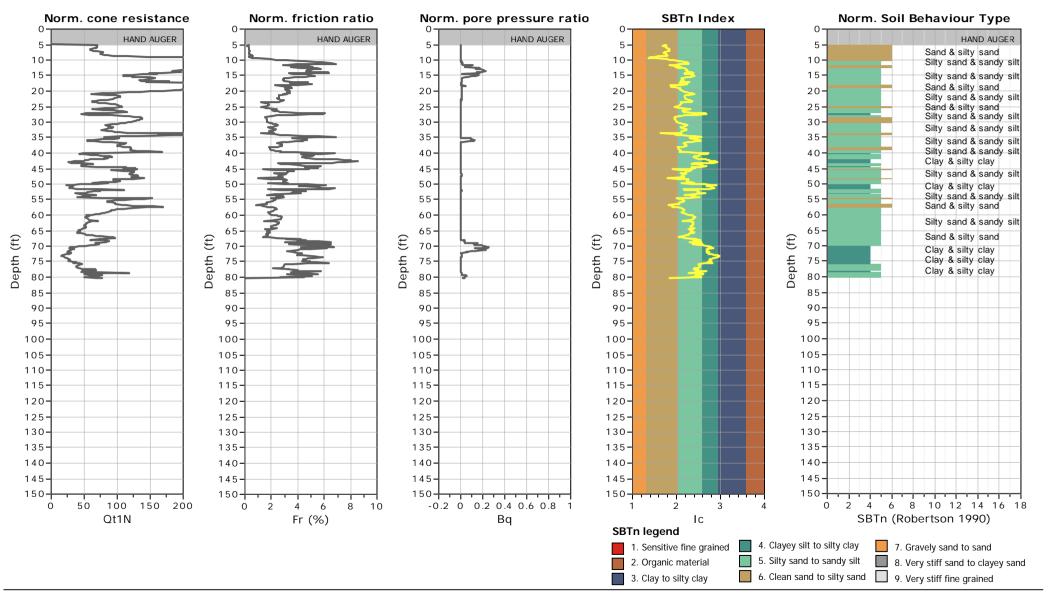


Location: Fresno, CA

Total depth: 80.38 ft Surface Elevation: 286.63 ft

Coords: X:6335169.00, Y:2144137.50

Cone Type: GDC-32
Cone Operator: J.Hancock



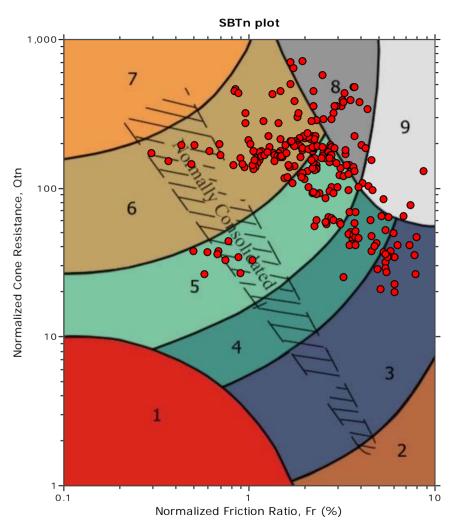


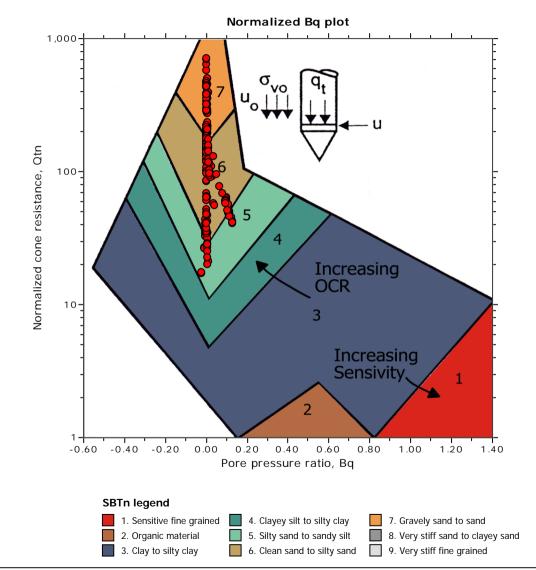
Location: Fresno, CA

Total depth: 45.11 ft Surface Elevation: 286.81 ft

Coords: X:6336999.50, Y:2141437.00

Cone Type: GDC-51
Cone Operator: A.Sancen



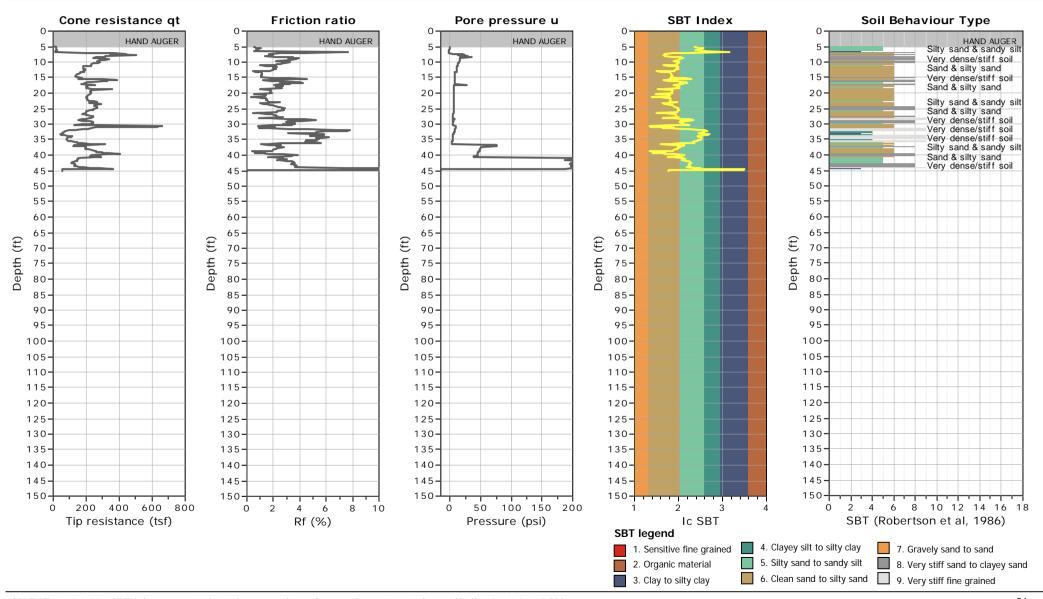




Location: Fresno, CA

Total depth: 45.11 ft Surface Elevation: 286.81 ft

Coords: X:6336999.50, Y:2141437.00

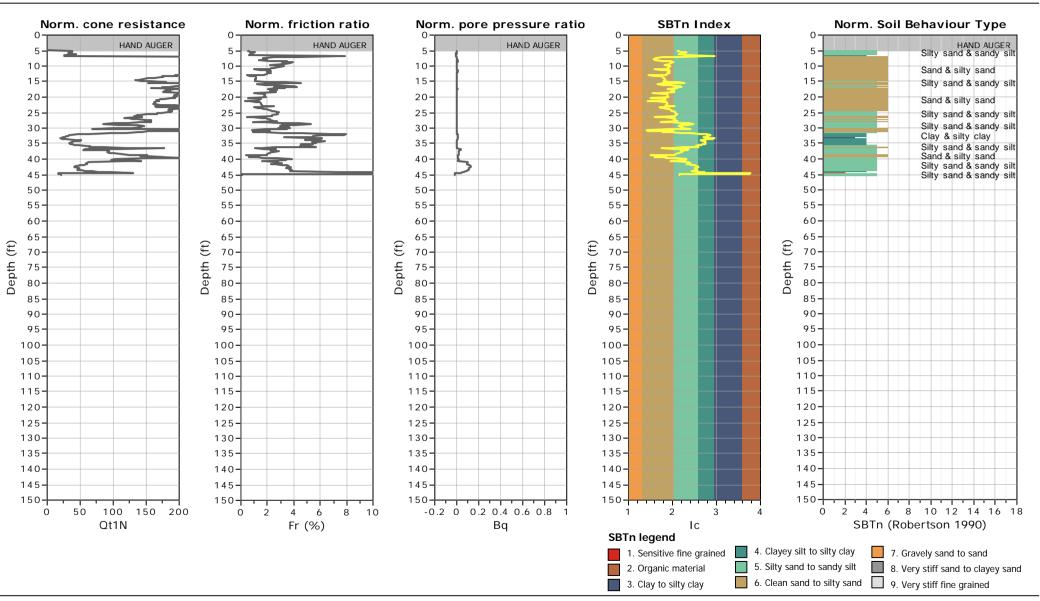




Location: Fresno, CA

Total depth: 45.11 ft Surface Elevation: 286.81 ft

Coords: X:6336999.50, Y:2141437.00



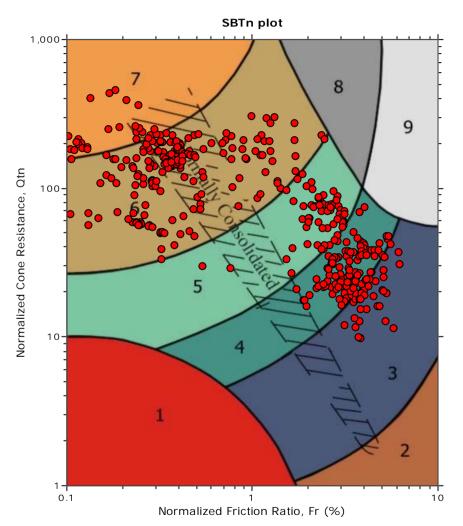


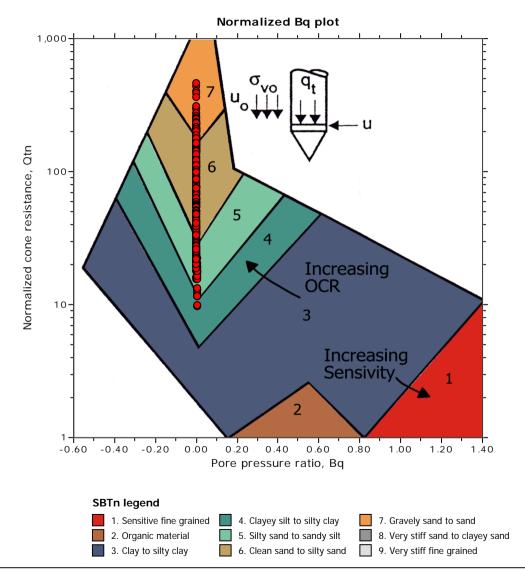
Location: Fresno, CA

Total depth: 80.05 ft Surface Elevation: 287.88 ft

Coords: X:6337145.50, Y:2141271.50

Cone Type: GDC-51
Cone Operator: A.Sancen



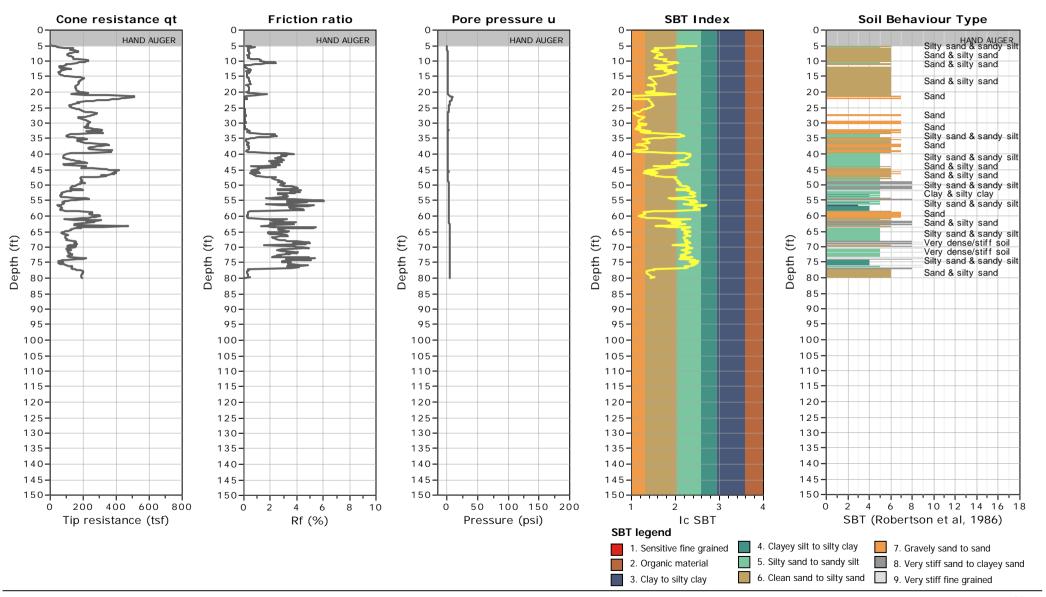




Location: Fresno, CA

Total depth: 80.05 ft Surface Elevation: 287.88 ft

Coords: X:6337145.50, Y:2141271.50

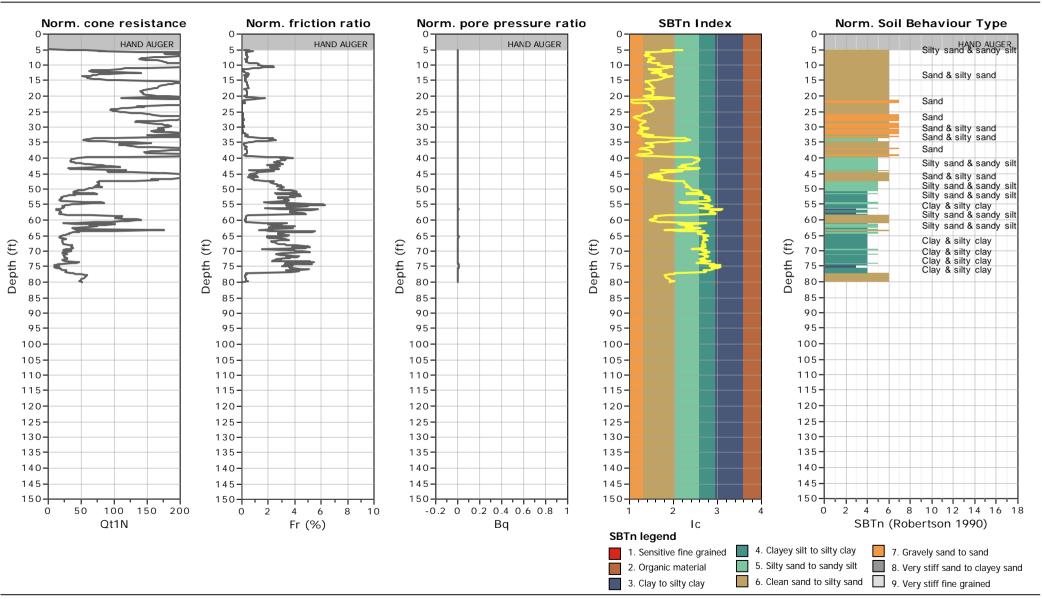




Location: Fresno, CA

Total depth: 80.05 ft Surface Elevation: 287.88 ft

Coords: X:6337145.50, Y:2141271.50



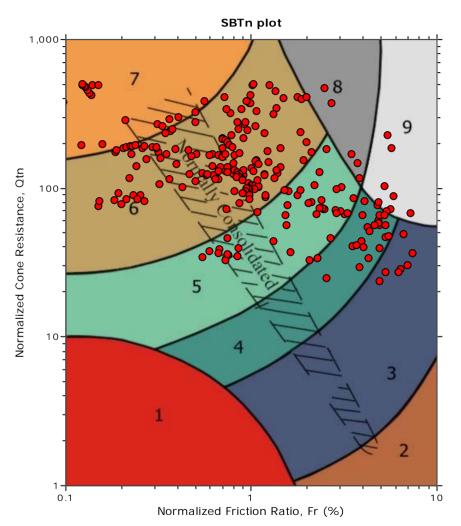


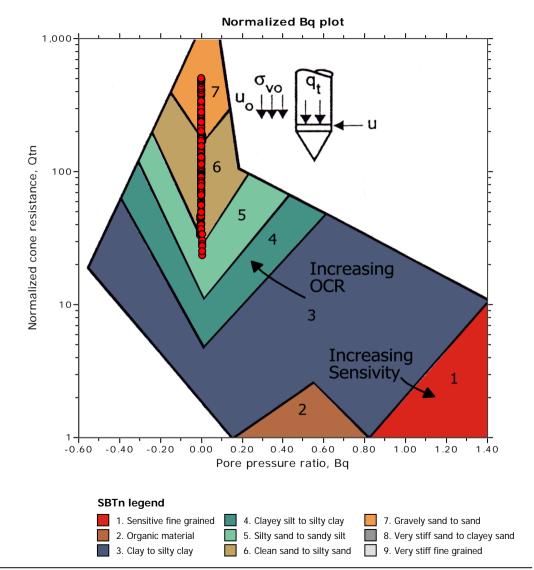
Location: Fresno, CA

Total depth: 64.14 ft Surface Elevation: 288.89 ft

Coords: X:6338690.00, Y:2138777.75

Cone Type: GDC-51
Cone Operator: A.Sancen







Location: Fresno, CA

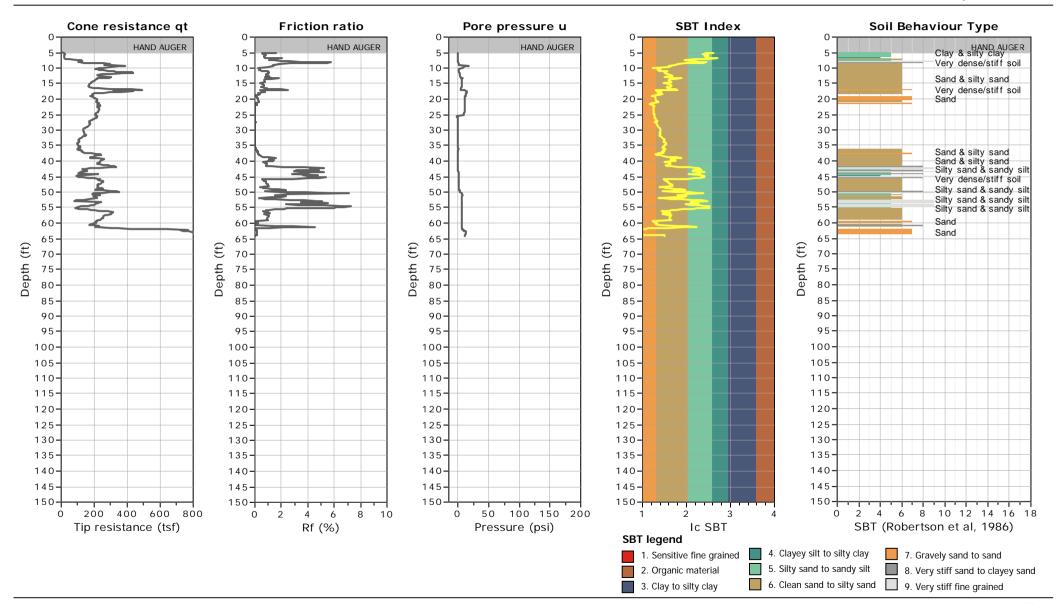
Total depth: 64.14 ft

**CPT: S0030CPT** 

Surface Elevation: 288.89 ft Coords: X:6338690.00, Y:2138777.75

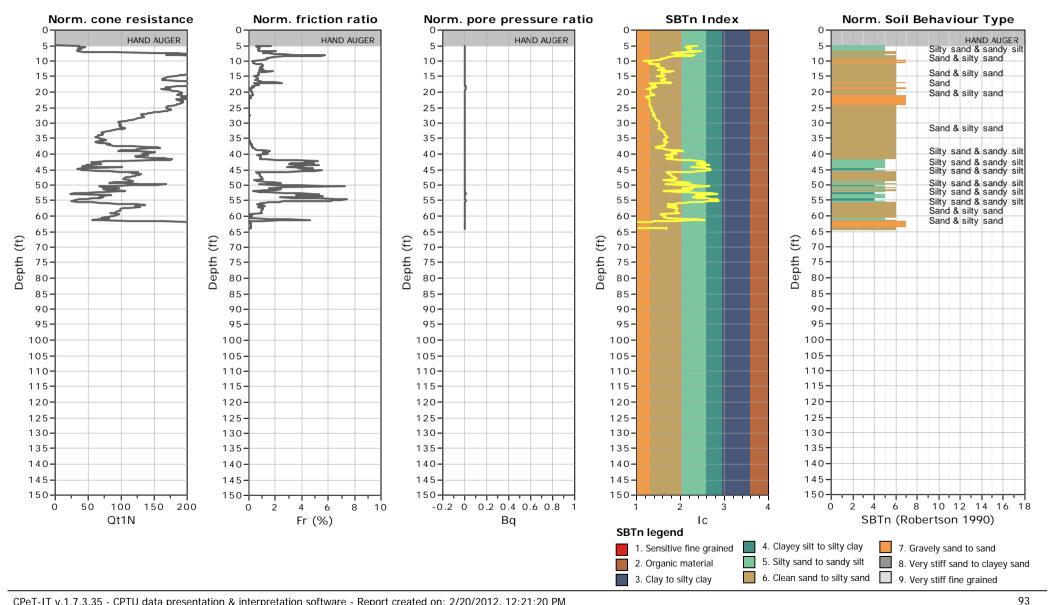
Cone Type: GDC-51

Cone Operator: A.Sancen



Coords: X:6338690.00, Y:2138777.75

Project: California High-Speed Train Cone Type: GDC-51 Location: Fresno, CA Cone Operator: A.Sancen



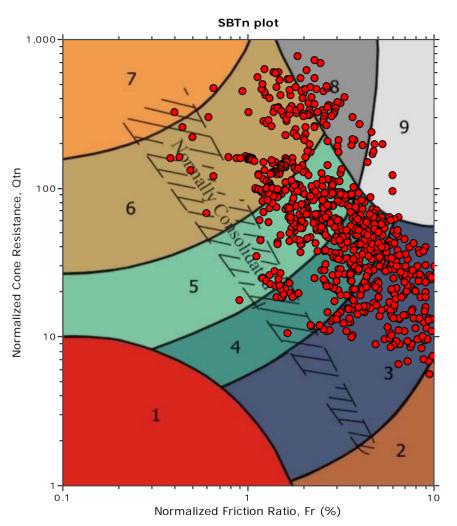


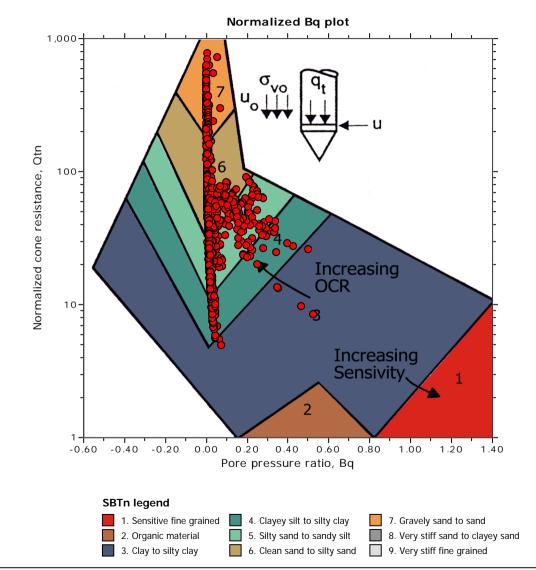
Location: Fresno, CA

Total depth: 150.43 ft Surface Elevation: 289.27 ft

Coords: X:6338936.00, Y:2138496.75

Cone Type: GDC-32 Cone Operator: J.Hancock





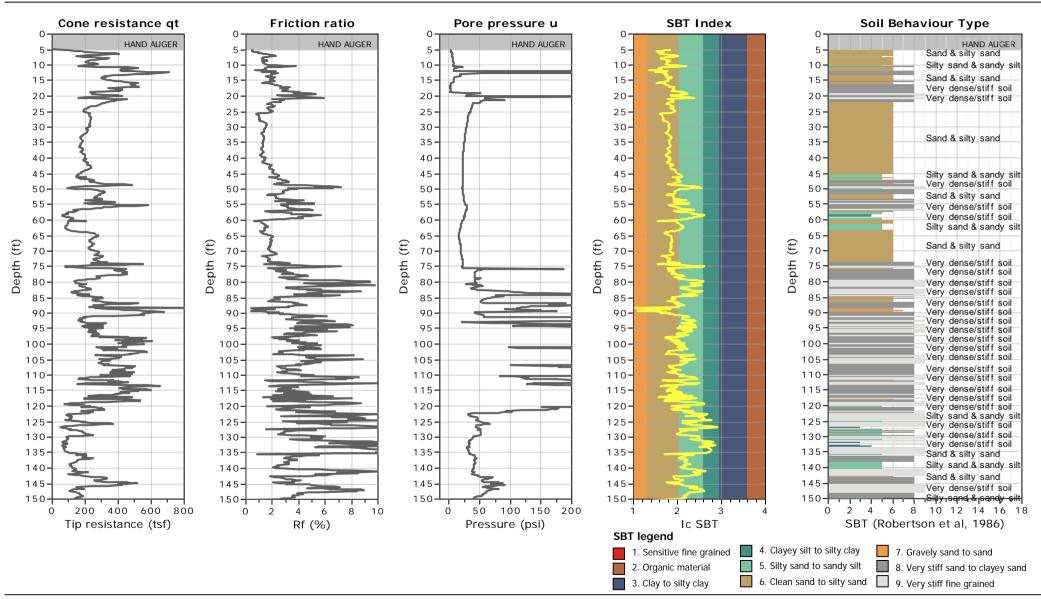


Location: Fresno, CA

Total depth: 150.43 ft Surface Elevation: 289.27 ft

Coords: X:6338936.00, Y:2138496.75

Cone Type: GDC-32
Cone Operator: J.Hancock



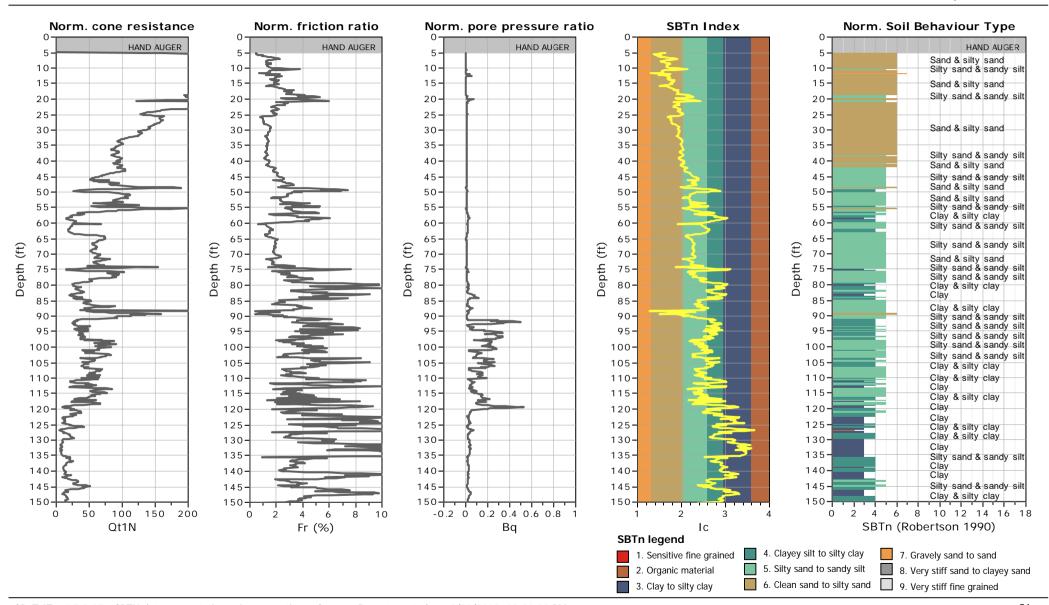


Location: Fresno, CA

Total depth: 150.43 ft Surface Elevation: 289.27 ft

Coords: X:6338936.00, Y:2138496.75

Cone Type: GDC-32 Cone Operator: J.Hancock



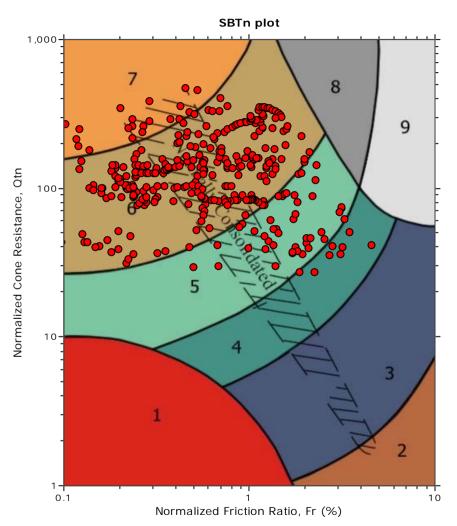


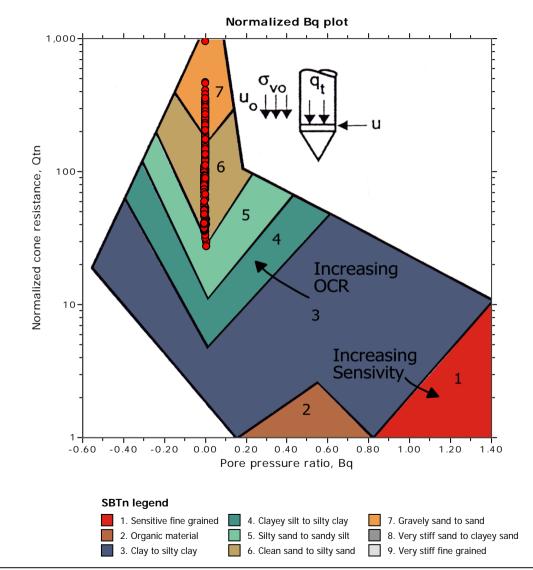
Location: Fresno, CA

Total depth: 90.72 ft Surface Elevation: 290.12 ft

Coords: X:6339868.00, Y:2137996.50

Cone Type: GDC-51
Cone Operator: A.Sancen

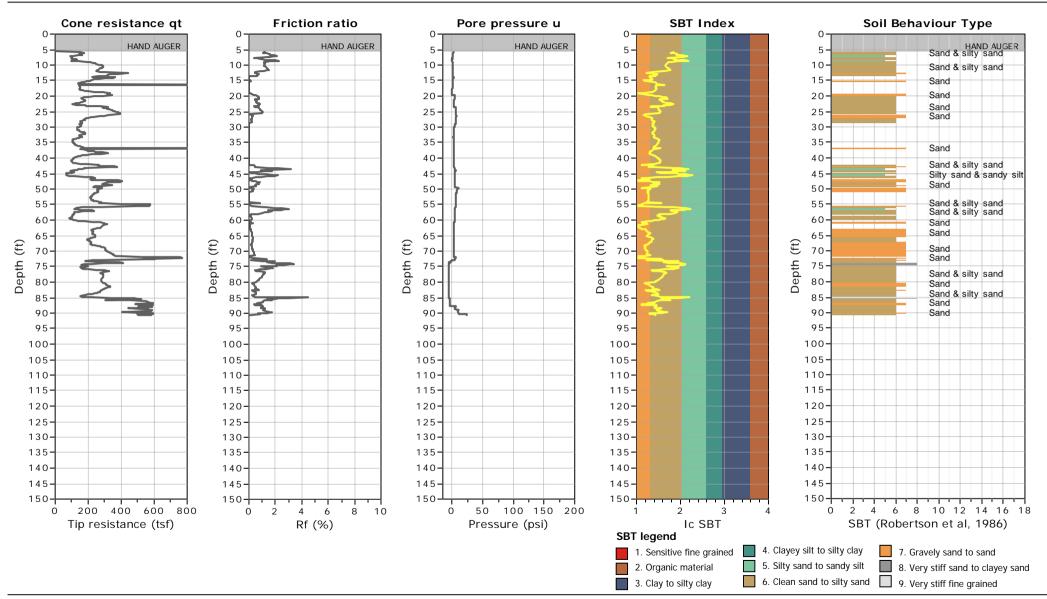




Location: Fresno, CA

Total depth: 90.72 ft Surface Elevation: 290.12 ft

Coords: X:6339868.00, Y:2137996.50

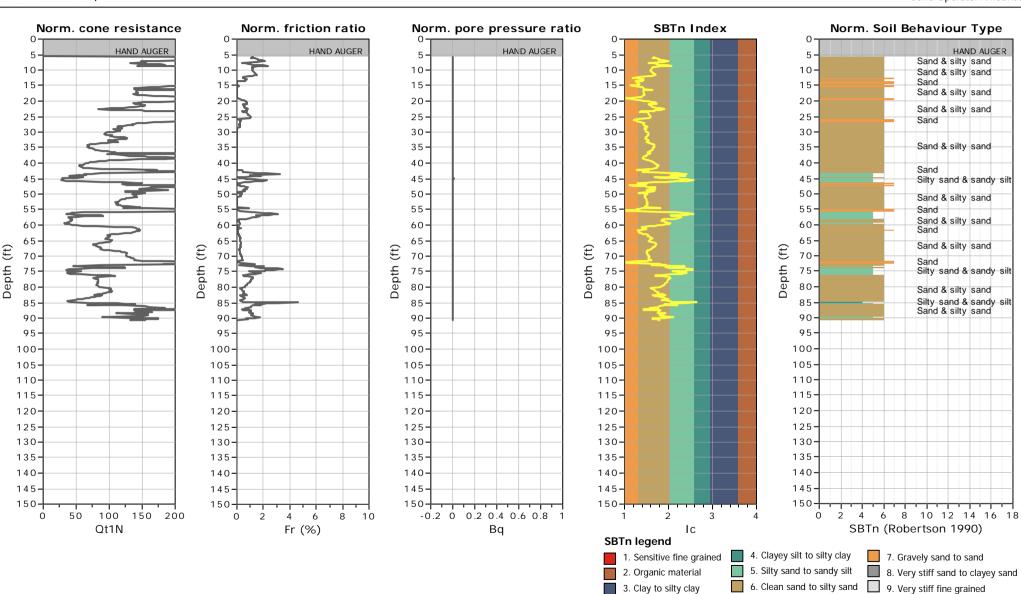




Location: Fresno, CA

Total depth: 90.72 ft Surface Elevation: 290.12 ft

Coords: X:6339868.00, Y:2137996.50



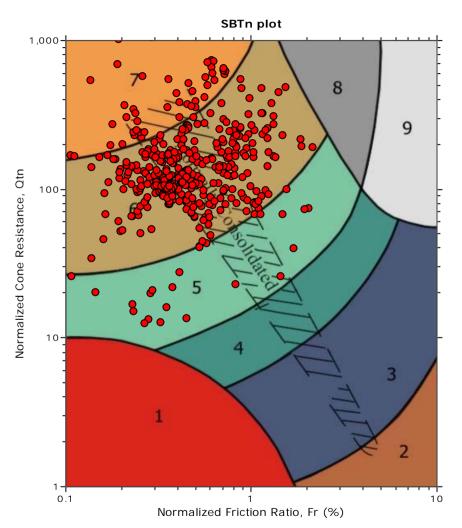


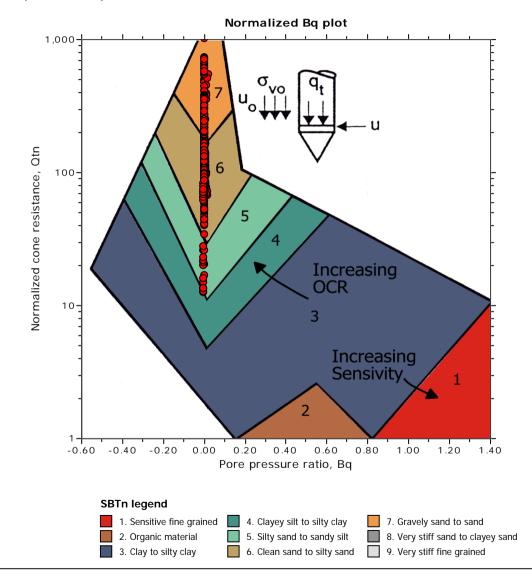
Location: Fresno, CA

Total depth: 75.13 ft Surface Elevation: 290.53 ft

Coords: X:6340055.50, Y:2136102.75

Cone Type: GDC-32
Cone Operator: J.Hancock







Location: Fresno, CA

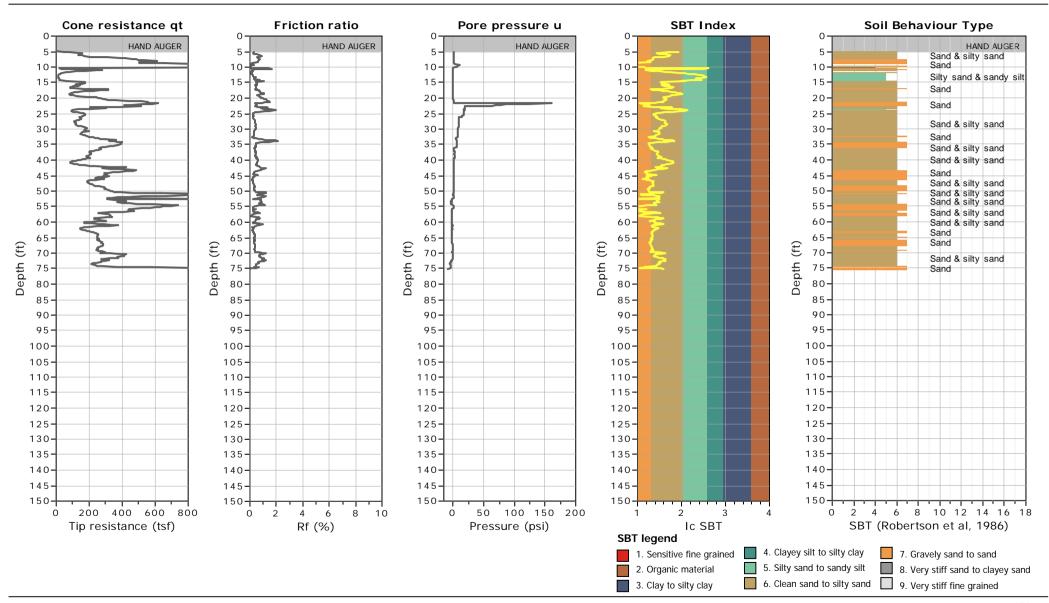
CPT: S0033CPT Total depth: 75.13 ft

Cone Type: GDC-32

Surface Elevation: 290.53 ft

Coords: X:6340055.50, Y:2136102.75

Cone Operator: J.Hancock





**CPT: S0033CPT** 

Total depth: 75.13 ft

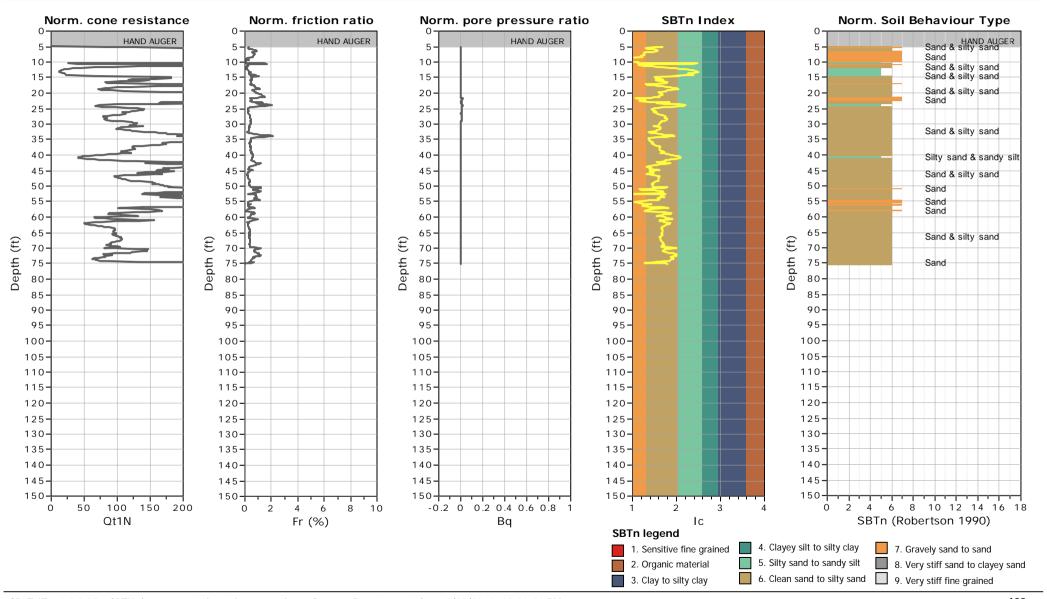
Surface Elevation: 290.53 ft

Coords: X:6340055.50, Y:2136102.75

Cone Type: GDC-32 Cone Operator: J.Hancock

Project: California High-Speed Train

Location: Fresno, CA



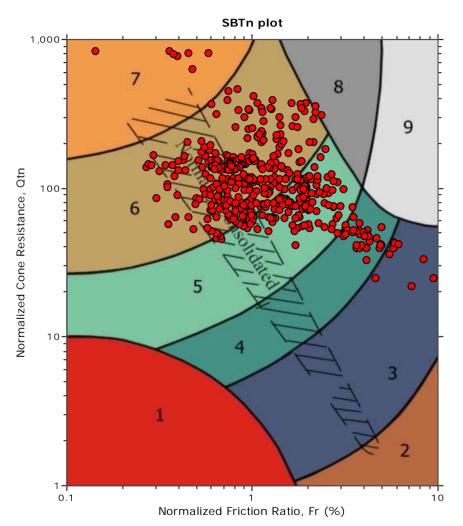


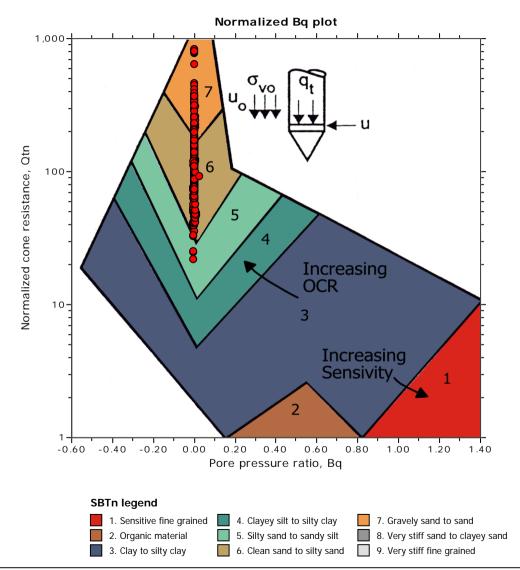
Location: Fresno, CA

Total depth: 83.99 ft Surface Elevation: 297.03 ft

Coords: X:6340437.00, Y:2135354.25

Cone Type: GDC-24
Cone Operator: A.Sancen







Location: Fresno, CA

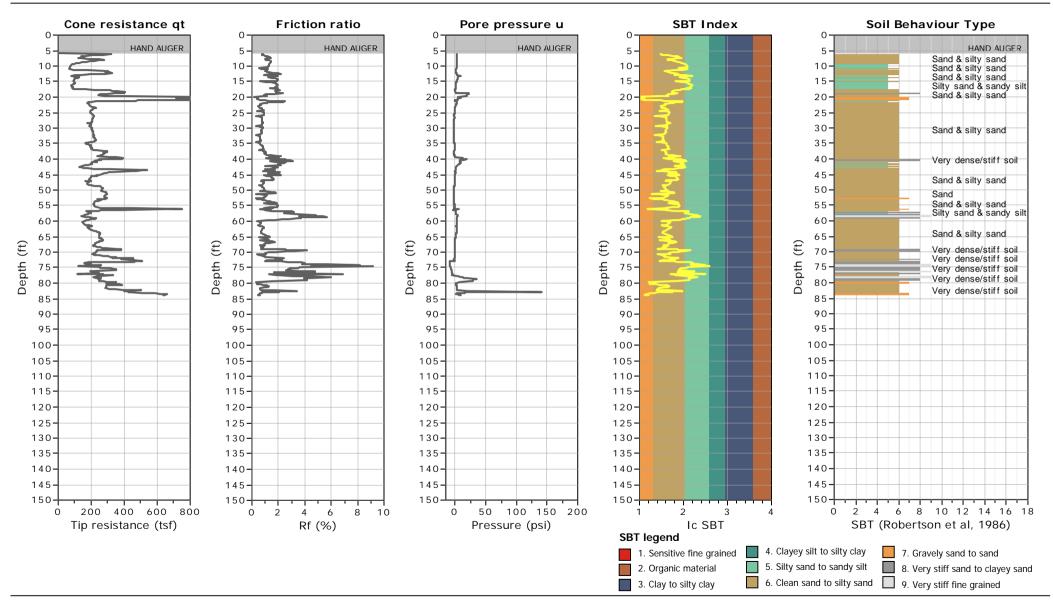
CPT: S0034CPT

Total depth: 83.99 ft Surface Elevation: 297.03 ft

Coords: X:6340437.00, Y:2135354.25

Cone Type: GDC-24

Cone Operator: A.Sancen





CPT: S0034CPT

Total depth: 83.99 ft

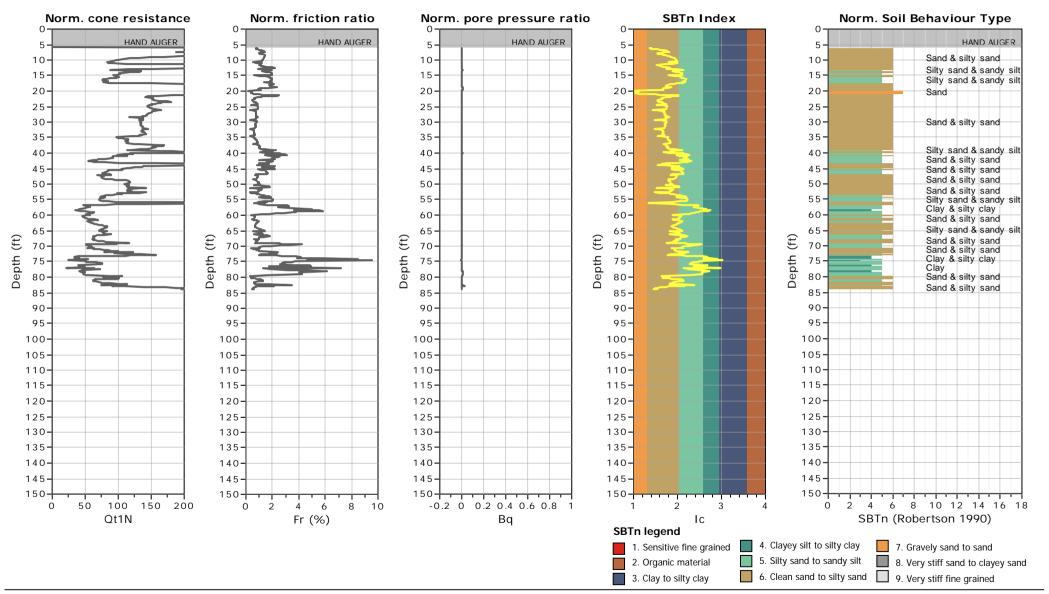
Surface Elevation: 297.03 ft

Coords: X:6340437.00, Y:2135354.25

Cone Type: GDC-24
Cone Operator: A.Sancen

**Project: California High-Speed Train** 

Location: Fresno, CA



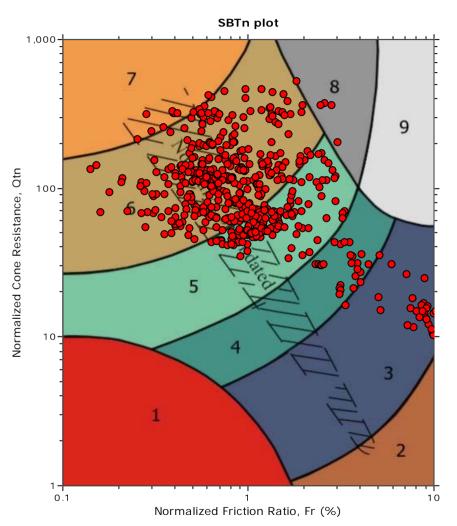


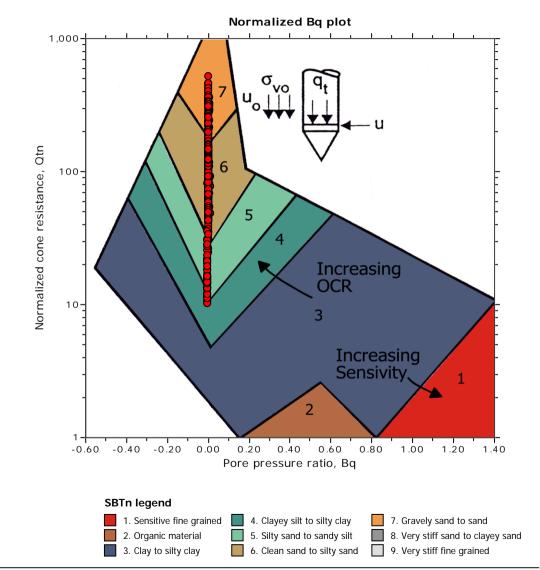
Location: Fresno, CA

Total depth: 95.14 ft

Surface Elevation: 303.67 ft Coords: X:6340365.00, Y:2134383.25

Cone Type: GDC-24
Cone Operator: A.Sancen



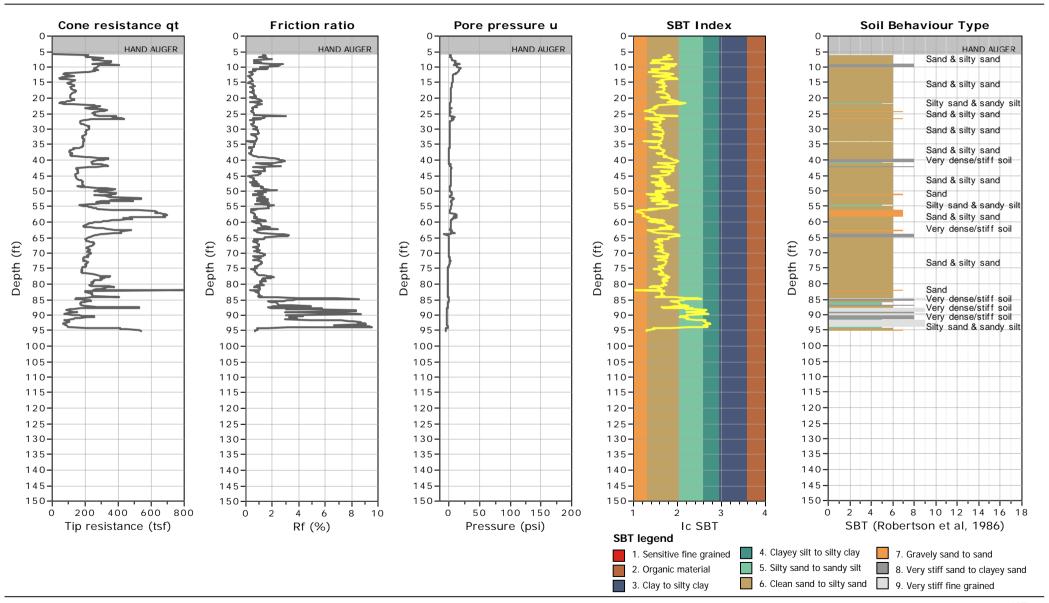




Location: Fresno, CA

Total depth: 95.14 ft Surface Elevation: 303.67 ft

Coords: X:6340365.00, Y:2134383.25



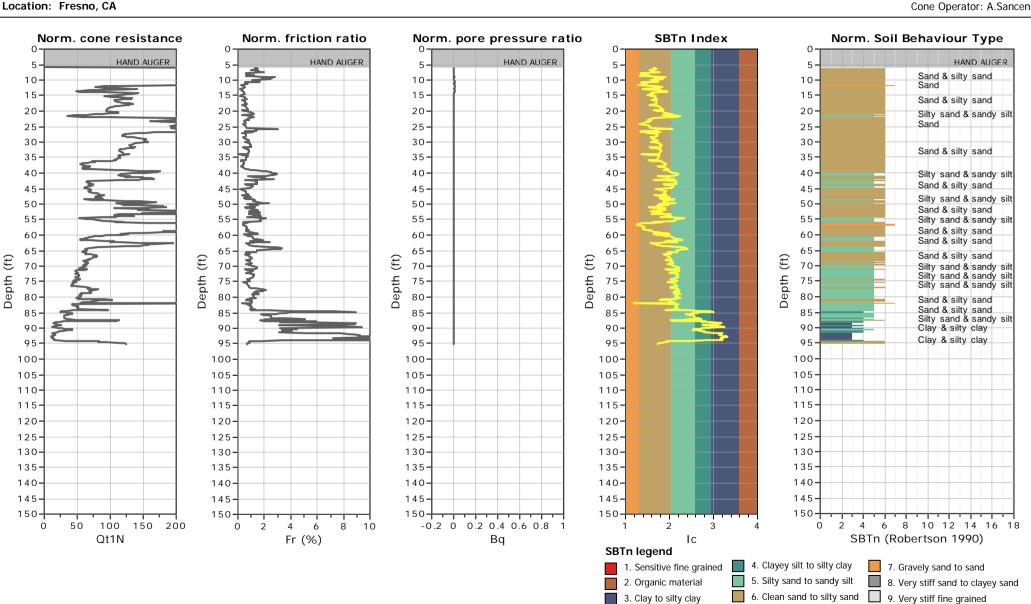


Location: Fresno, CA

Total depth: 95.14 ft

Surface Elevation: 303.67 ft Coords: X:6340365.00, Y:2134383.25

Cone Type: GDC-24



3. Clay to silty clay



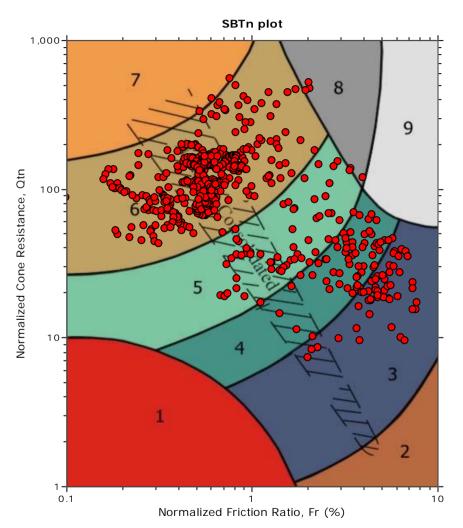
Location: Fresno, CA

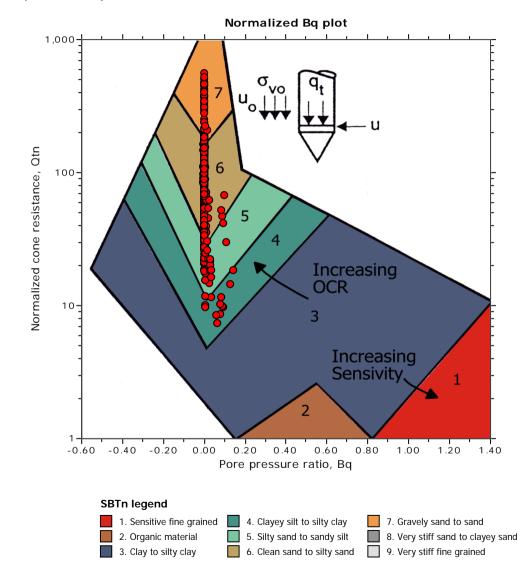
Total depth: 100.23 ft Surface Elevation: 289.15 ft

Coords: X:6340899.50, Y:2133420.25

Cone Type: GDC-32
Cone Operator: J.Hancock

#### SBT - Bq plots (normalized)





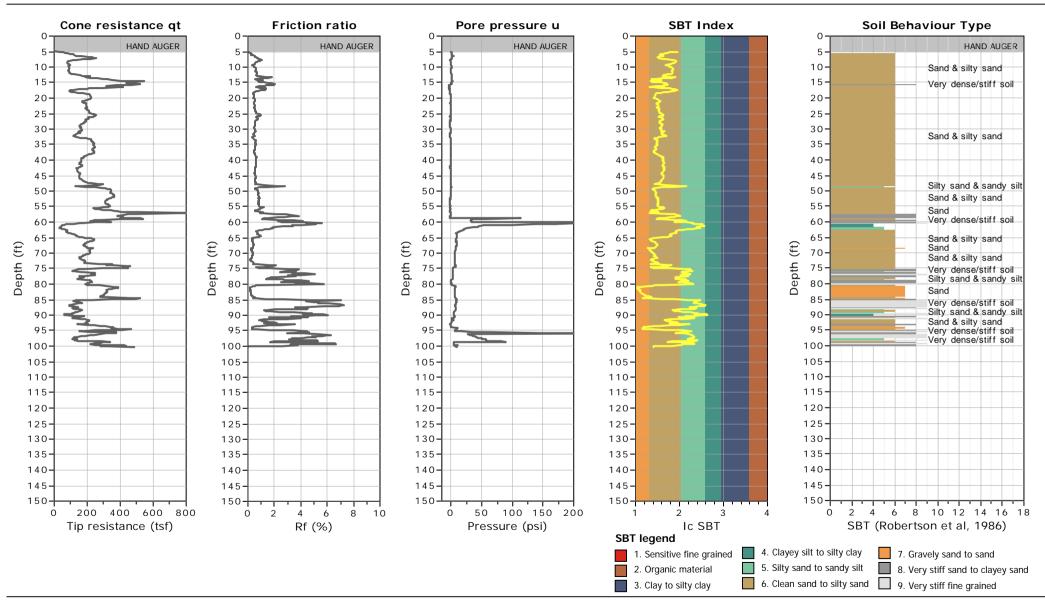


Location: Fresno, CA

Total depth: 100.23 ft Surface Elevation: 289.15 ft

Coords: X:6340899.50, Y:2133420.25

Cone Type: GDC-32
Cone Operator: J.Hancock



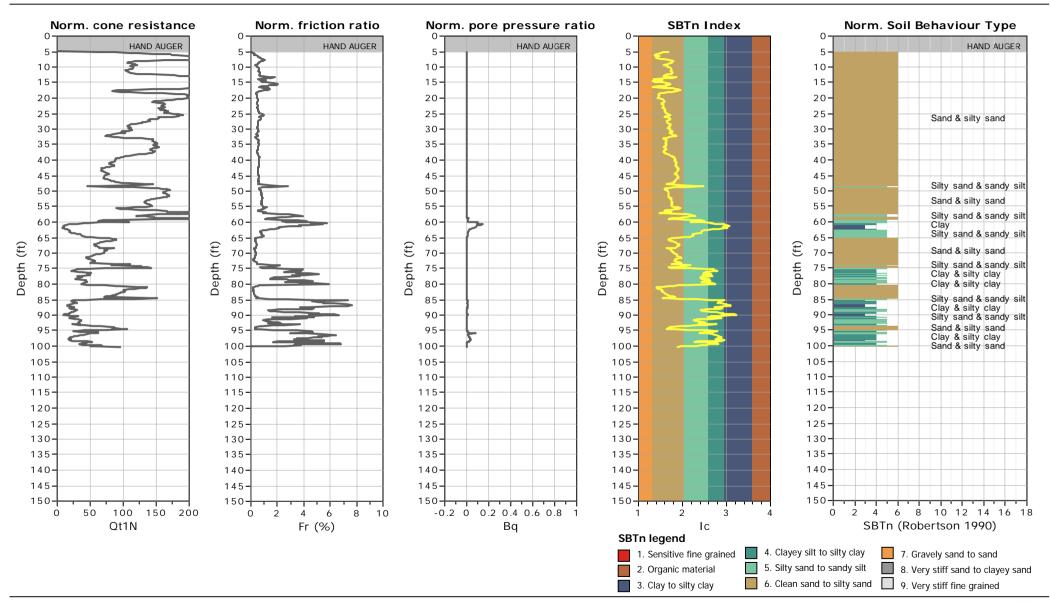


Location: Fresno, CA

Total depth: 100.23 ft Surface Elevation: 289.15 ft

Coords: X:6340899.50, Y:2133420.25

Cone Type: GDC-32 Cone Operator: J.Hancock





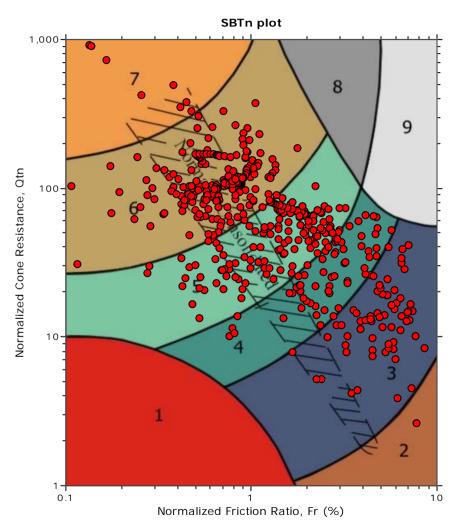
Location: Fresno, CA

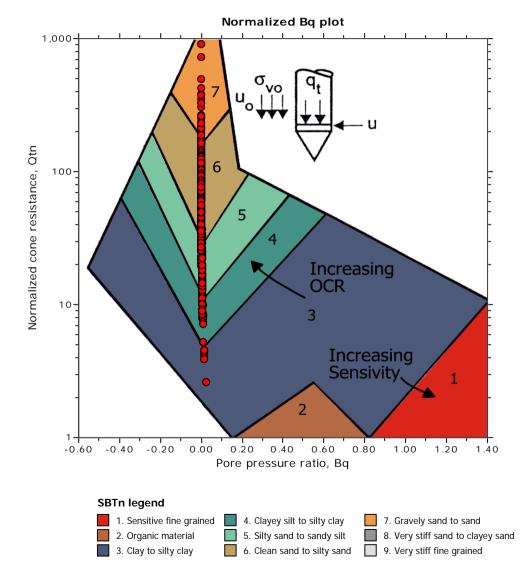
Total depth: 100.23 ft Surface Elevation: 288.02 ft

Coords: X:6340355.00, Y:2132620.75

Cone Type: GDC-51
Cone Operator: A.Sancen

### SBT - Bq plots (normalized)





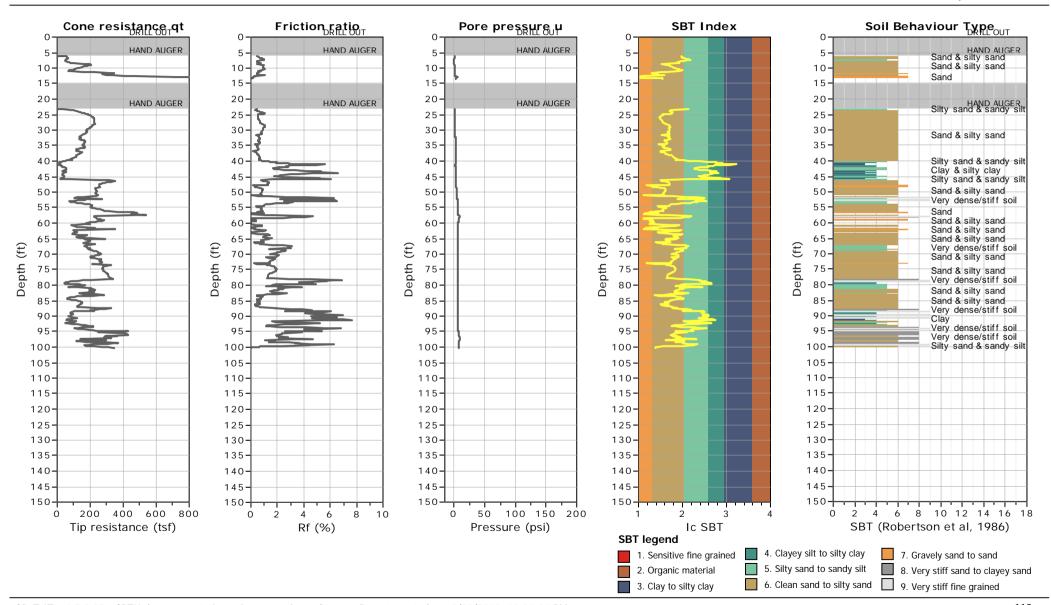


Location: Fresno, CA

Total depth: 100.23 ft Surface Elevation: 288.02 ft

Coords: X:6340355.00, Y:2132620.75

Cone Type: GDC-51
Cone Operator: A.Sancen



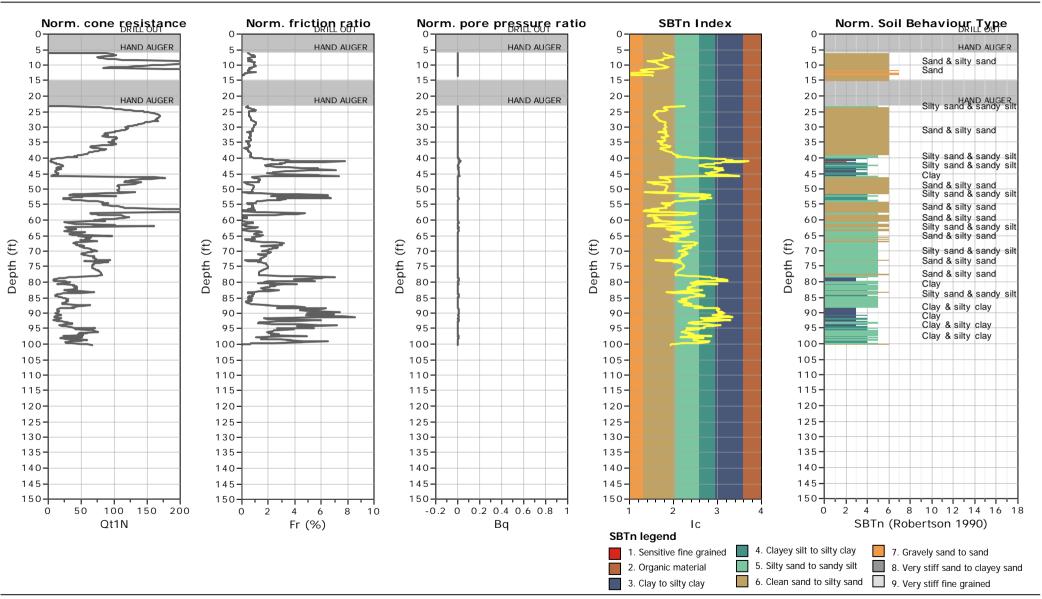


Location: Fresno, CA

Total depth: 100.23 ft Surface Elevation: 288.02 ft

Coords: X:6340355.00, Y:2132620.75

Cone Type: GDC-51
Cone Operator: A.Sancen





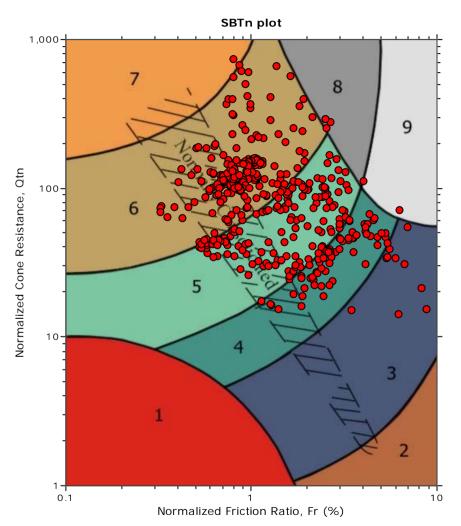
Location: Fresno, CA

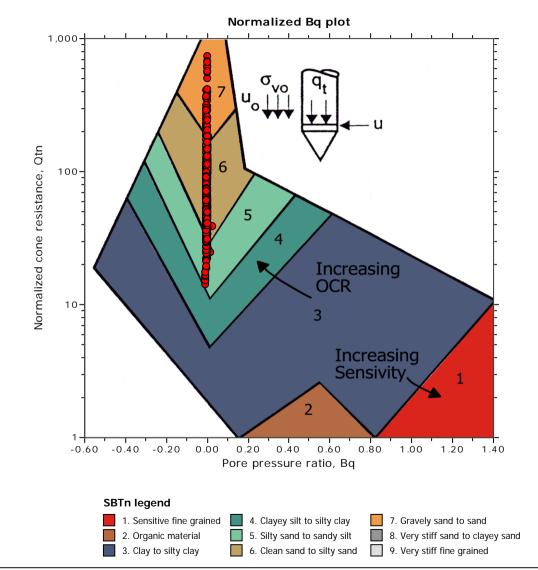
Total depth: 80.05 ft Surface Elevation: 289.27 ft

Coords: X:6341444.00, Y:2130805.75

Cone Type: GDC-32 Cone Operator: J.Hancock

### SBT - Bq plots (normalized)





Total depth: 80.05 ft Surface Elevation: 289.27 ft

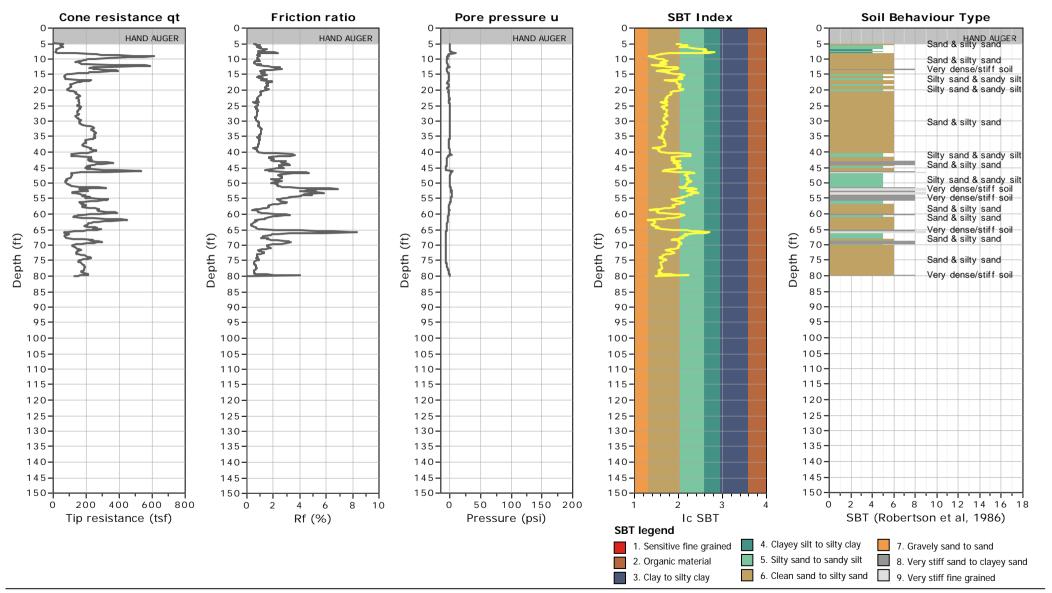


Project: California High-Speed Train

Location: Fresno, CA

Coords: X:6341444.00, Y:2130805.75 Cone Type: GDC-32

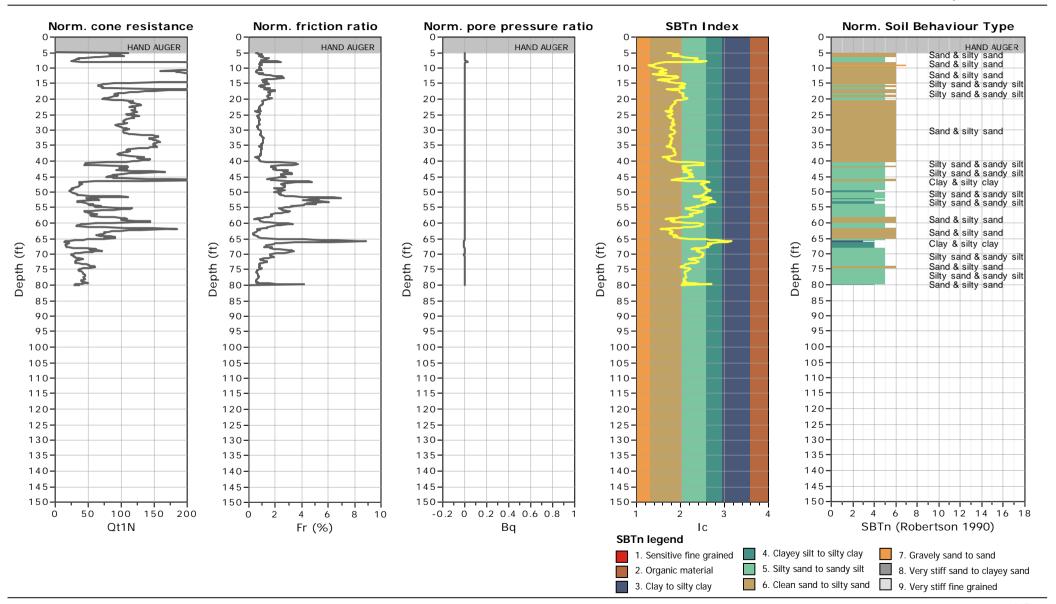
Cone Operator: J.Hancock



Total depth: 80.05 ft Surface Elevation: 289.27 ft



Coords: X:6341444.00, Y:2130805.75 Project: California High-Speed Train Cone Type: GDC-32 Location: Fresno, CA Cone Operator: J.Hancock





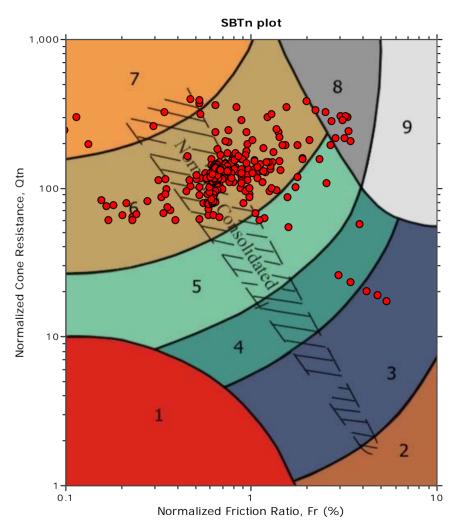
Location: Fresno, CA

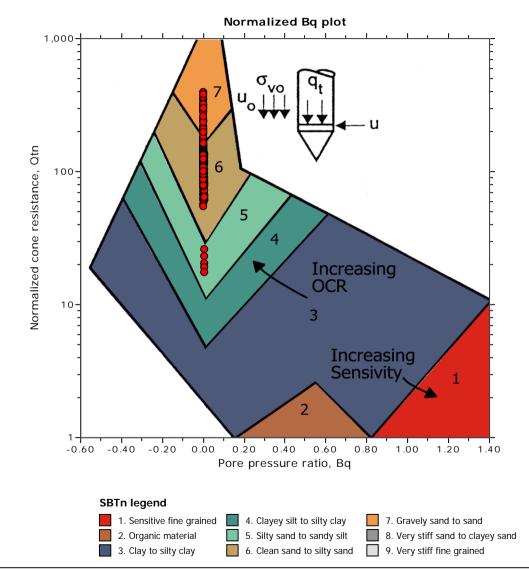
Total depth: 50.20 ft Surface Elevation: 287.29 ft

Coords: X:6340323.50, Y:2129825.00

Cone Type: GDC-51
Cone Operator: A.Sancen

### SBT - Bq plots (normalized)







Location: Fresno, CA

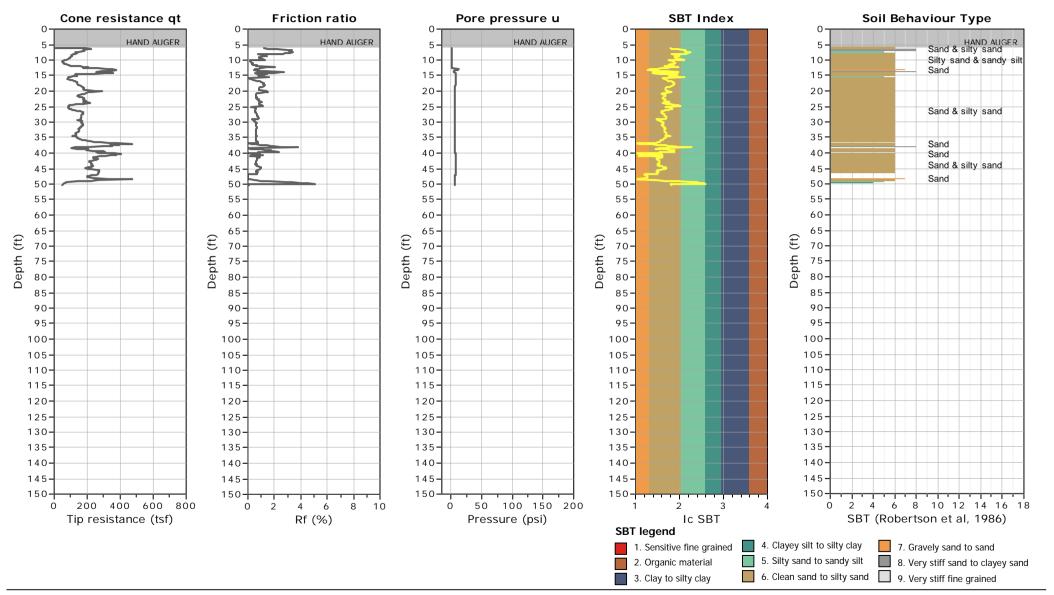
CPT: S0038CPT

Total depth: 50.20 ft Surface Elevation: 287.29 ft

Coords: X:6340323.50, Y:2129825.00

Cone Type: GDC-51

Cone Operator: A.Sancen





Location: Fresno, CA

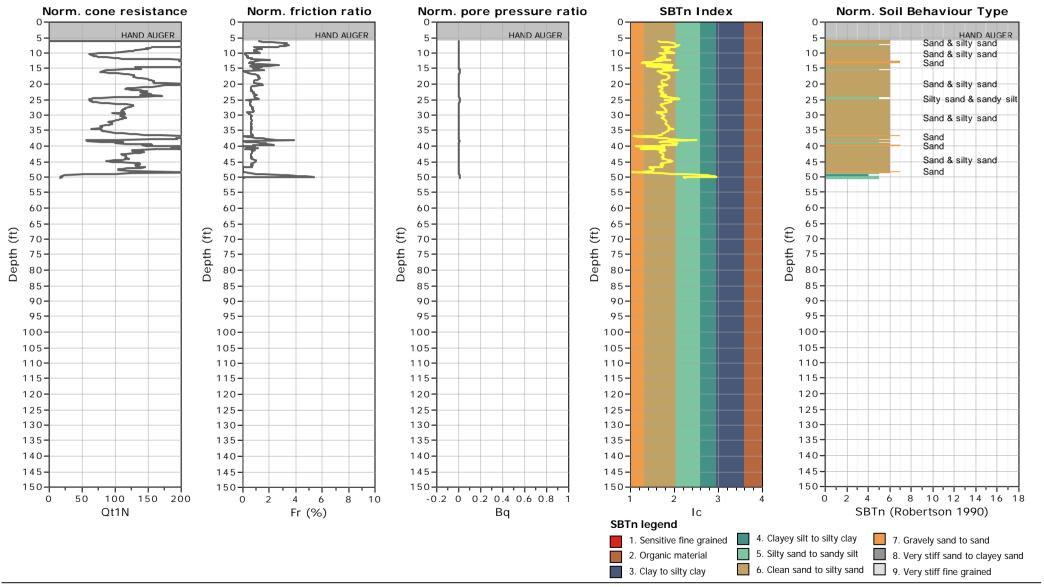
CPT: S0038CPT

Total depth: 50.20 ft Surface Elevation: 287.29 ft

Coords: X:6340323.50, Y:2129825.00

Cone Type: GDC-51

Cone Operator: A.Sancen





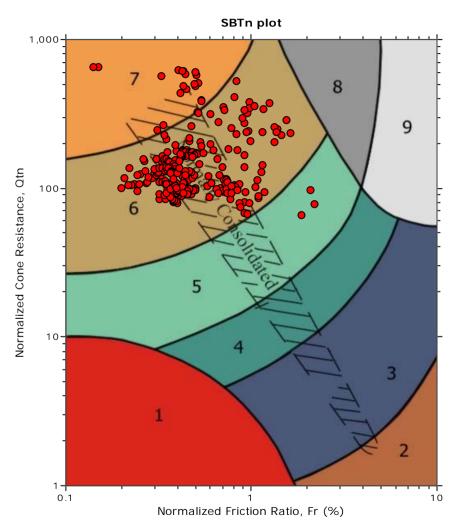
Location: Fresno, CA

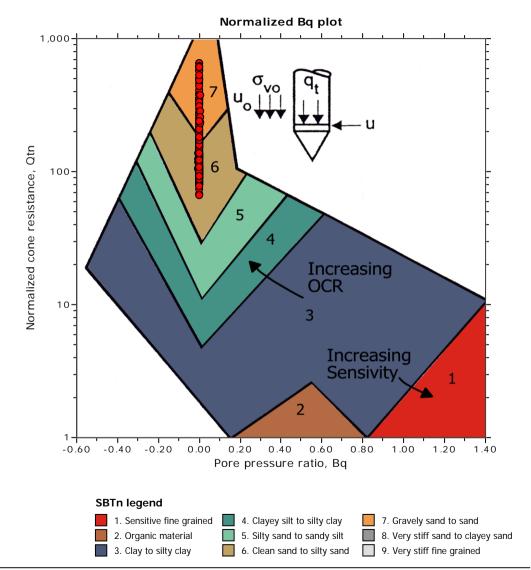
Total depth: 50.36 ft Surface Elevation: 290.43 ft

Coords: X:6341850.00, Y:2128141.50

Cone Type: GDC-32 Cone Operator: J.Hancock

### SBT - Bq plots (normalized)





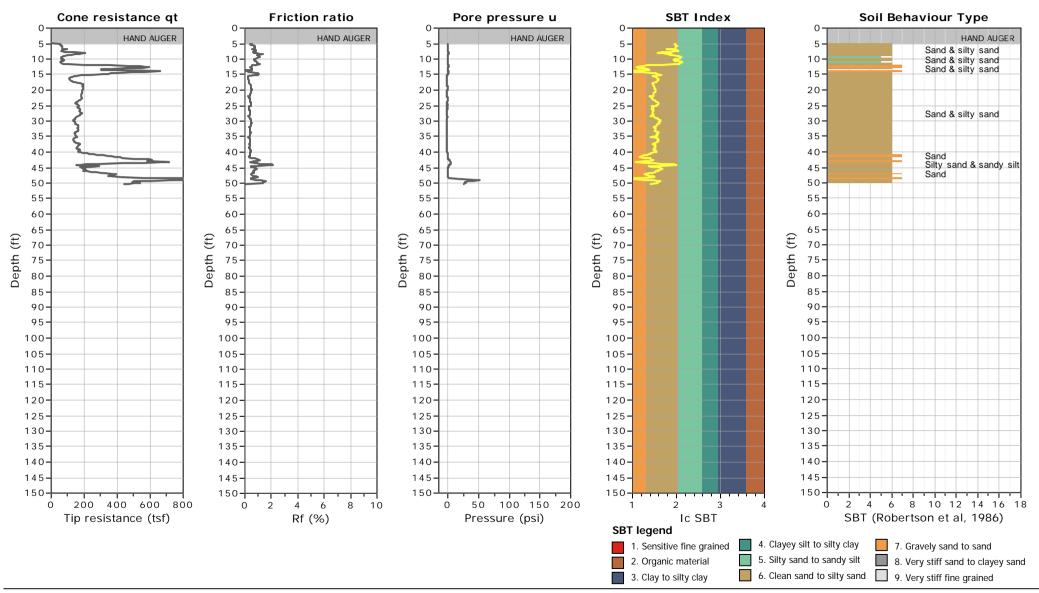


Location: Fresno, CA

Total depth: 50.36 ft Surface Elevation: 290.43 ft

Coords: X:6341850.00, Y:2128141.50

Cone Type: GDC-32
Cone Operator: J.Hancock



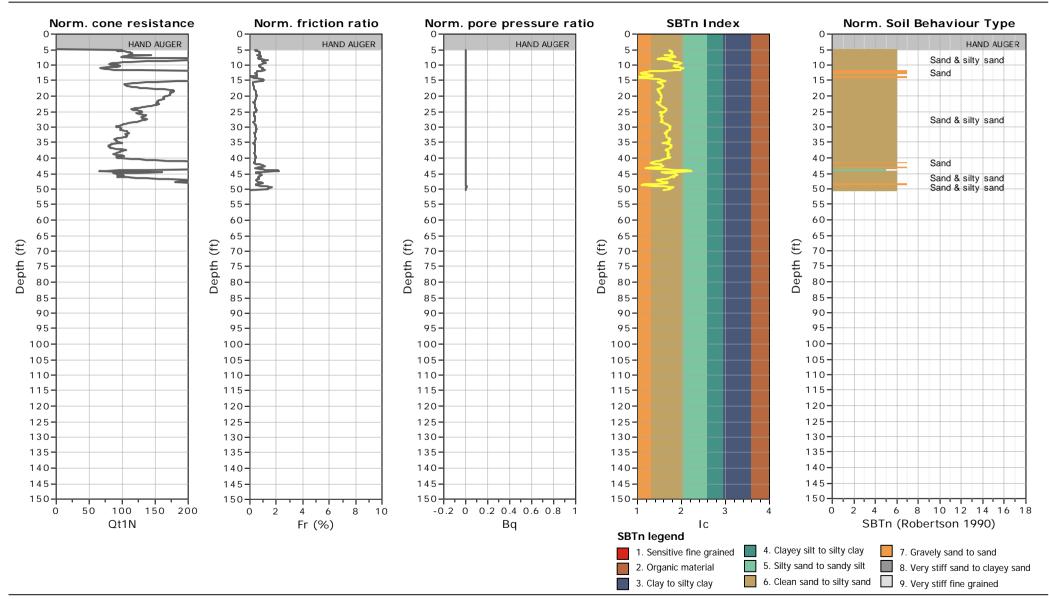


Location: Fresno, CA

Total depth: 50.36 ft Surface Elevation: 290.43 ft

Coords: X:6341850.00, Y:2128141.50

Cone Type: GDC-32
Cone Operator: J.Hancock





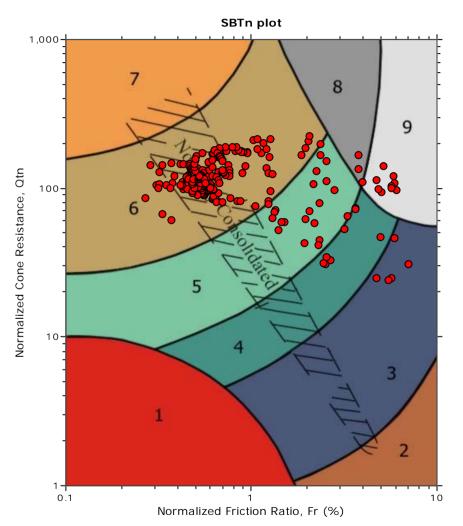
Location: Fresno, CA

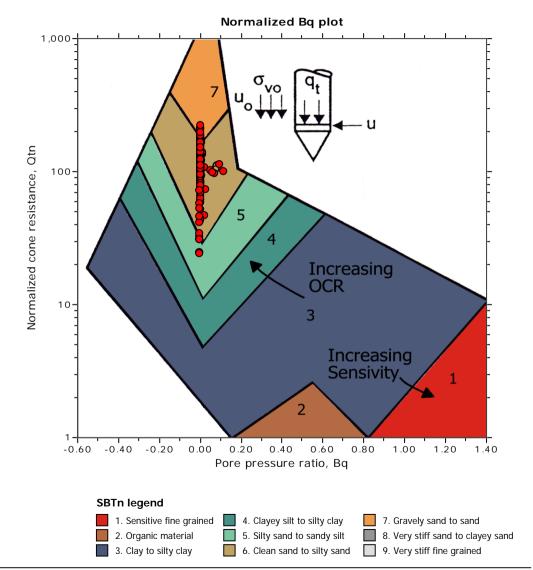
Total depth: 55.61 ft Surface Elevation: 289.19 ft

Coords: X:6340332.00, Y:2126307.25

Cone Type: GDC-32
Cone Operator: J.Hancock

### SBT - Bq plots (normalized)





Cone Type: GDC-32

**06/29/2012 ADDENDUM** 

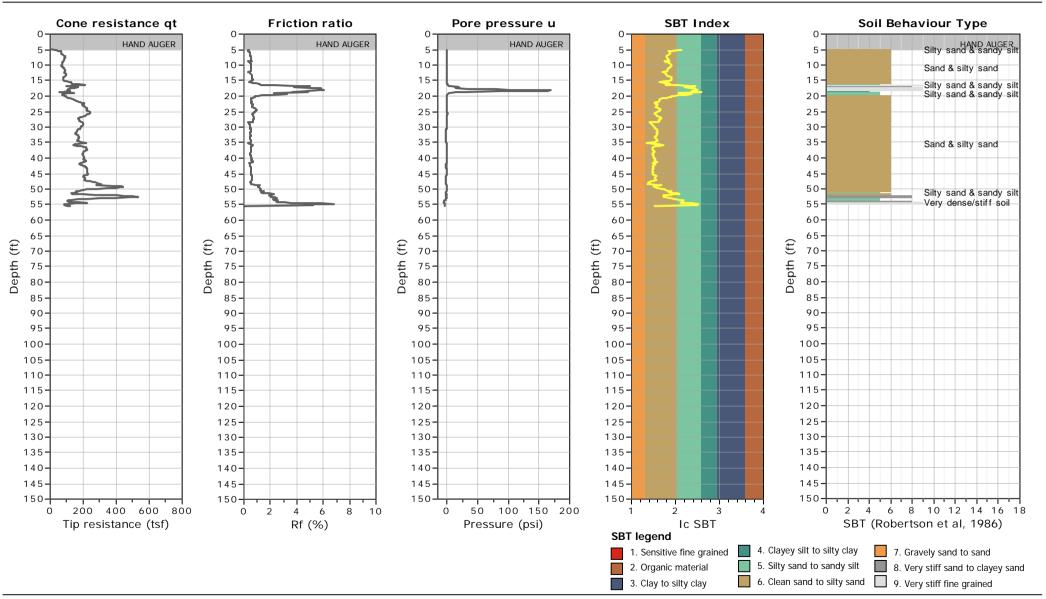
Project: California High-Speed Train

Location: Fresno, CA

Surface Elevation: 289.19 ft

Coords: X:6340332.00, Y:2126307.25

Cone Operator: J.Hancock





Location: Fresno, CA

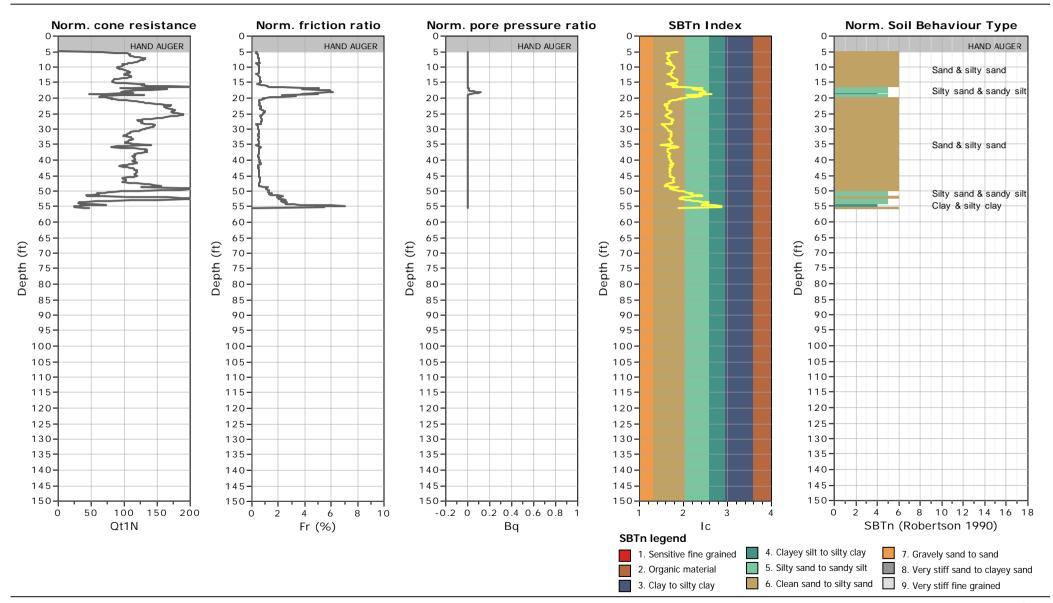
Total depth: 55.61 ft

CPT: S0040CPT

Surface Elevation: 289.19 ft Coords: X:6340332.00, Y:2126307.25

Cone Type: GDC-32

Cone Operator: J.Hancock

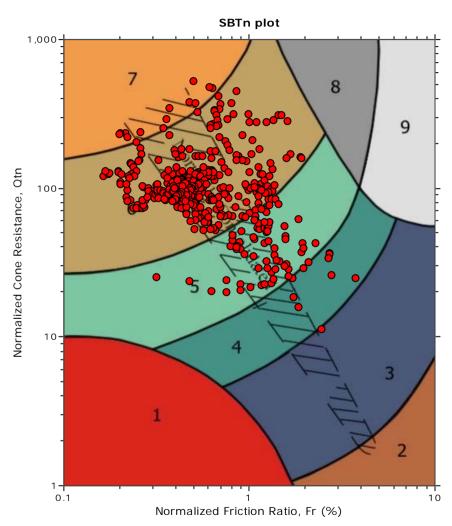


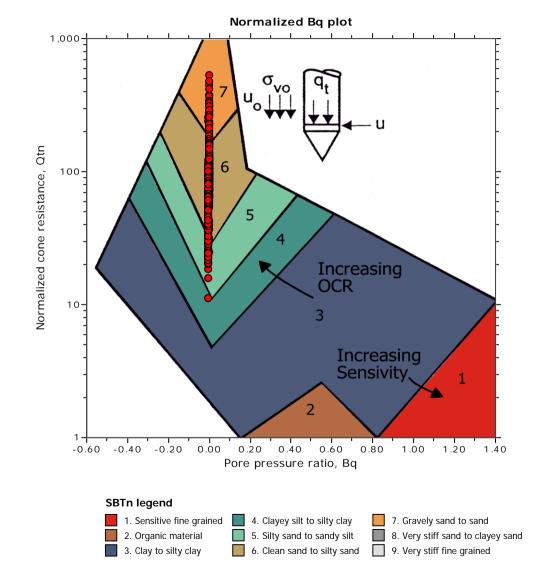
Cone Type: GDC-32

Project: California High-Speed Train

Location: Fresno, CA

### SBT - Bq plots (normalized)



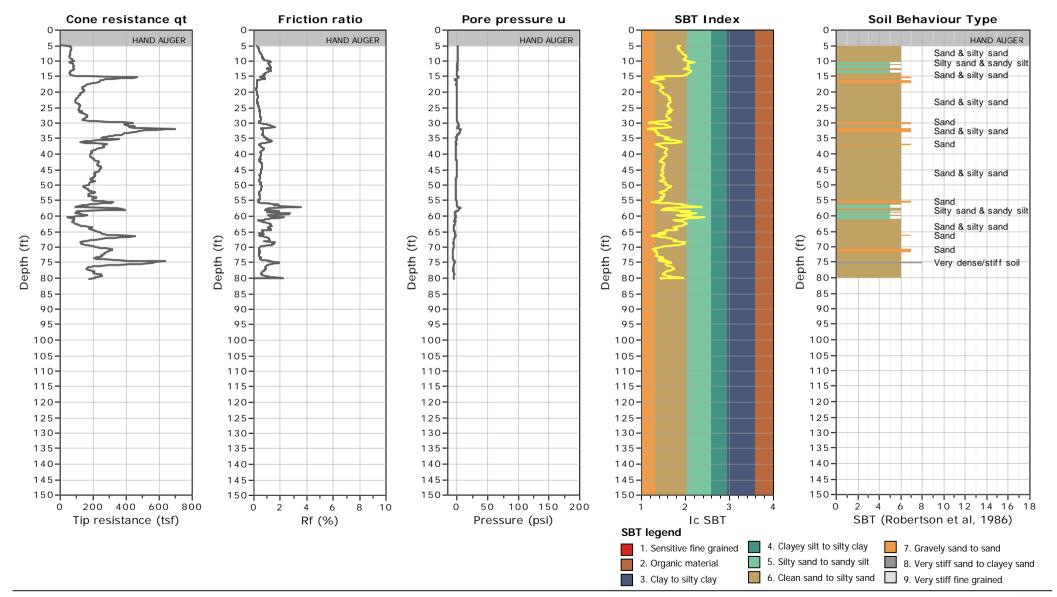


Surface Elevation: 293.06 ft

Coords: X:6341313.00, Y:2125479.50



Project:California High-Speed TrainCone Type: GDC-32Location:Fresno, CACone Operator: J.Hancock



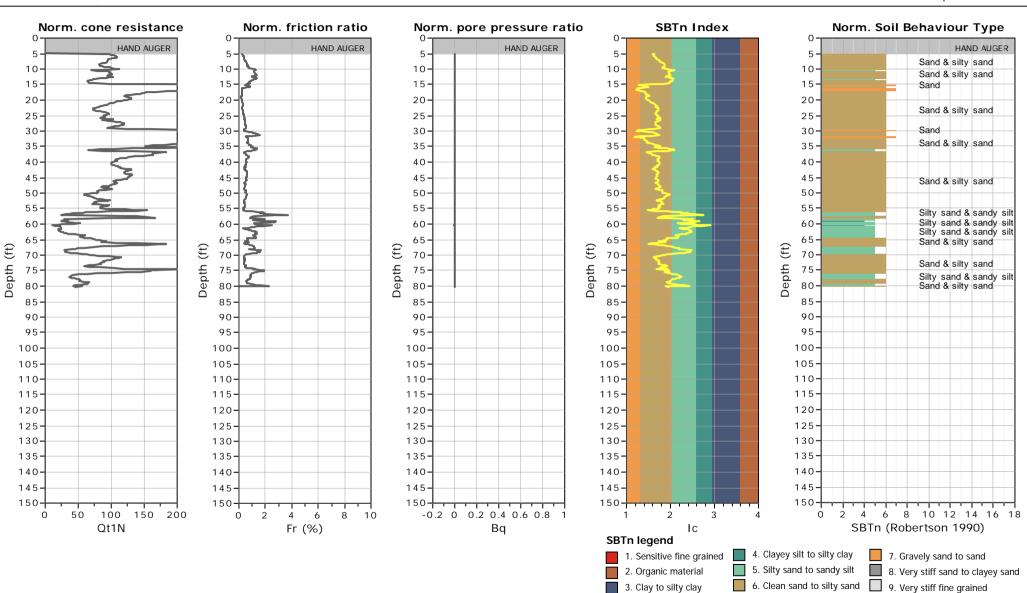


Location: Fresno, CA

Total depth: 80.22 ft

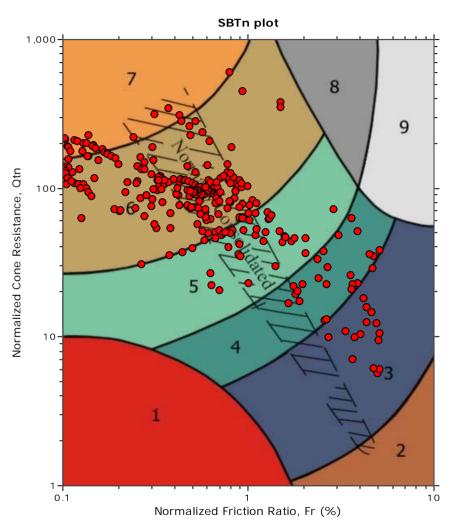
Surface Elevation: 293.06 ft Coords: X:6341313.00, Y:2125479.50

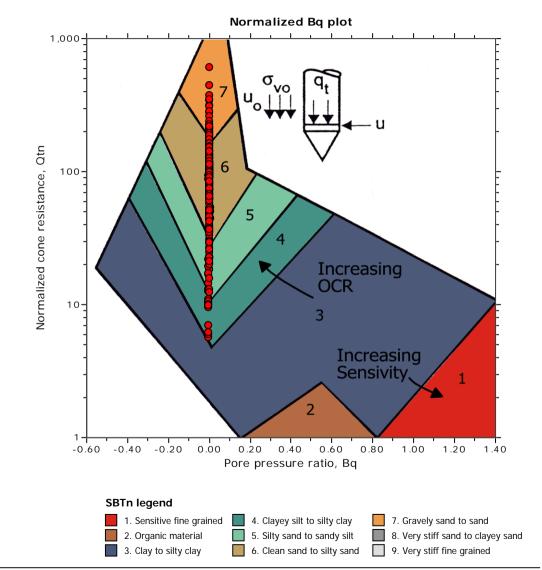
Cone Type: GDC-32 Cone Operator: J.Hancock



Location: Fresno, CA

### SBT - Bq plots (normalized)





06/29/2012 ADDENDUM 3 - RFP HSR 11-16

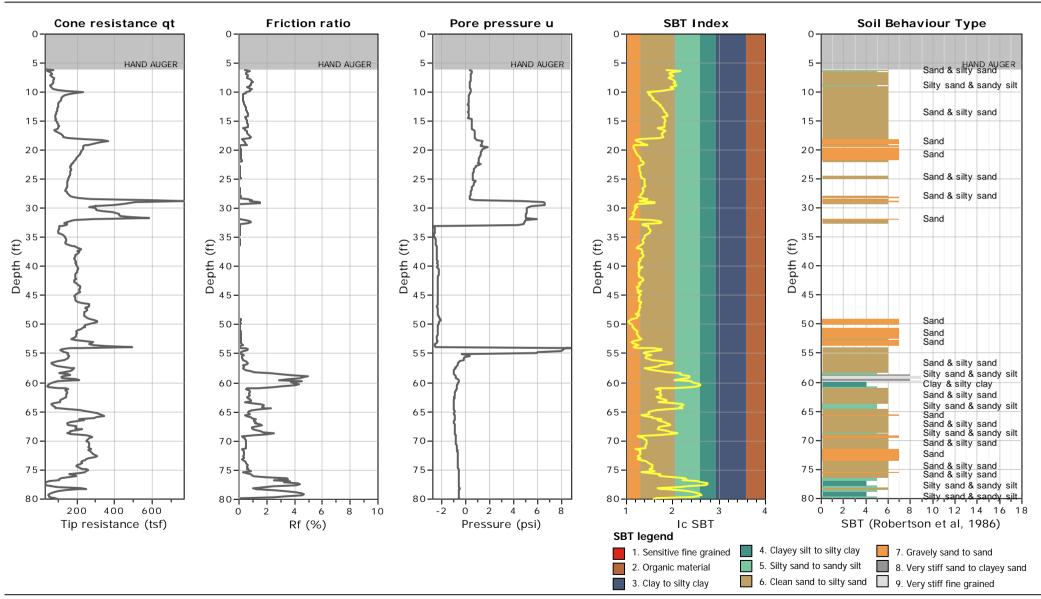


Location: Fresno, CA

Total depth: 80.05 ft Surface Elevation: 291.50 ft

Coords: X:6341813.50, Y:2125509.75

Cone Type: GDC-51 Cone Operator: A.Sancen



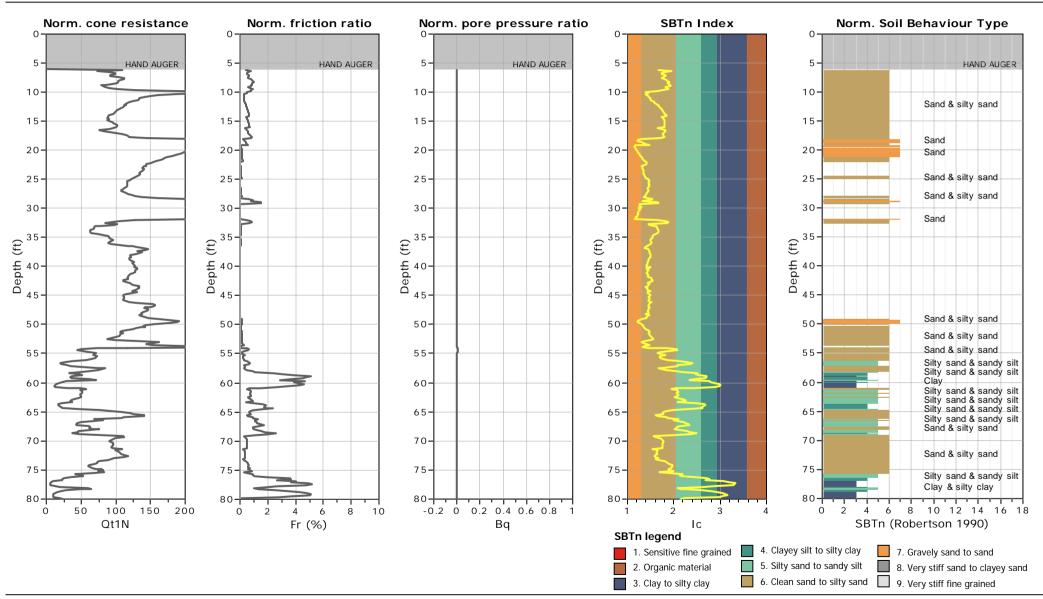


Location: Fresno, CA

Total depth: 80.05 ft Surface Elevation: 291.50 ft

Coords: X:6341813.50, Y:2125509.75

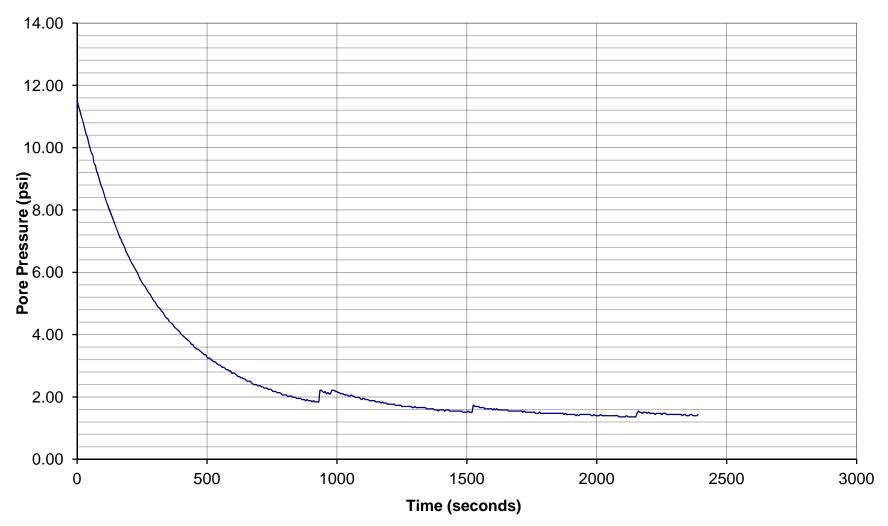
Cone Type: GDC-51
Cone Operator: A.Sancen





**Pore Pressure Dissipation Test** 

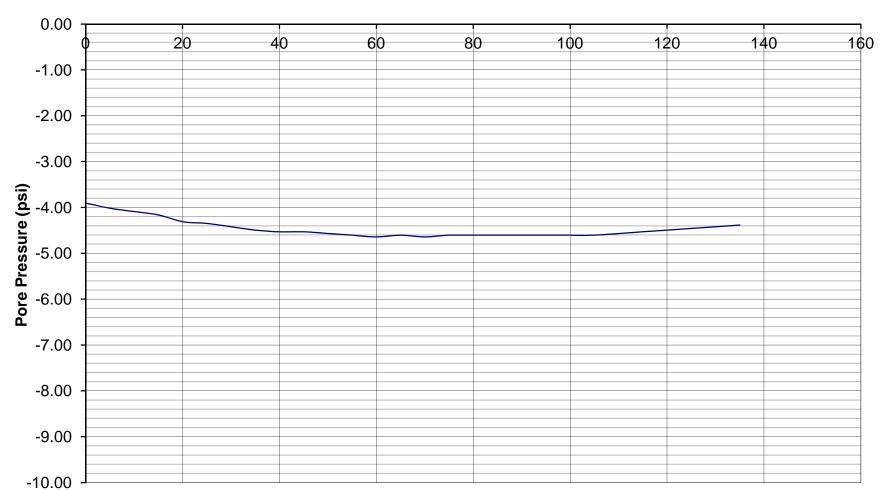
Sounding: S0001CPT
Depth: 50.03 feet
Site: Fresno
Engineer: B. Kluzniak





## **Pore Pressure Dissipation Test**

Sounding: S0005CPT
Depth: 76.77 feet
Site: Fresno
Engineer: B. Kluzniak

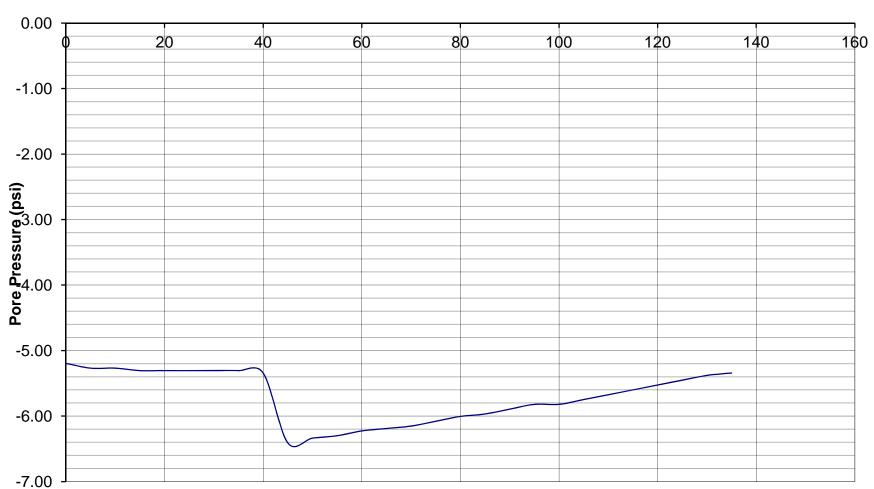


Time (seconds)



**Pore Pressure Dissipation Test** 

Sounding: S0006CPT
Depth: 80.05 feet
Site: Fresno
Engineer: B. Kluzniak

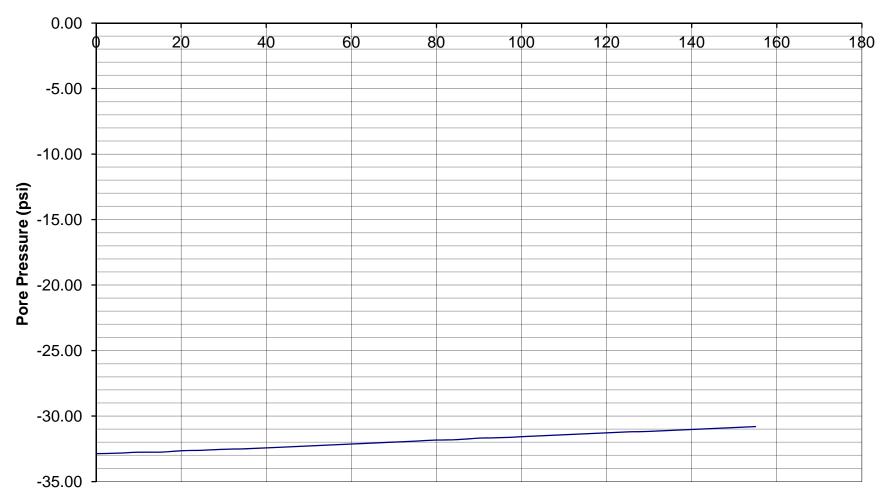


Time (seconds)



**Pore Pressure Dissipation Test** 

Sounding: S0008ACPT
Depth: 99.41 feet
Site: Fresno
Engineer: B. Kluzniak

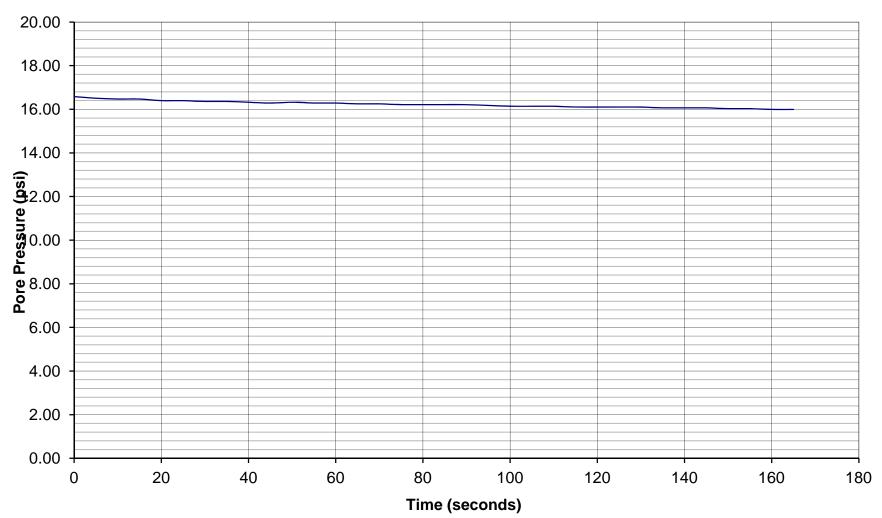


Time (seconds)



**Pore Pressure Dissipation Test** 

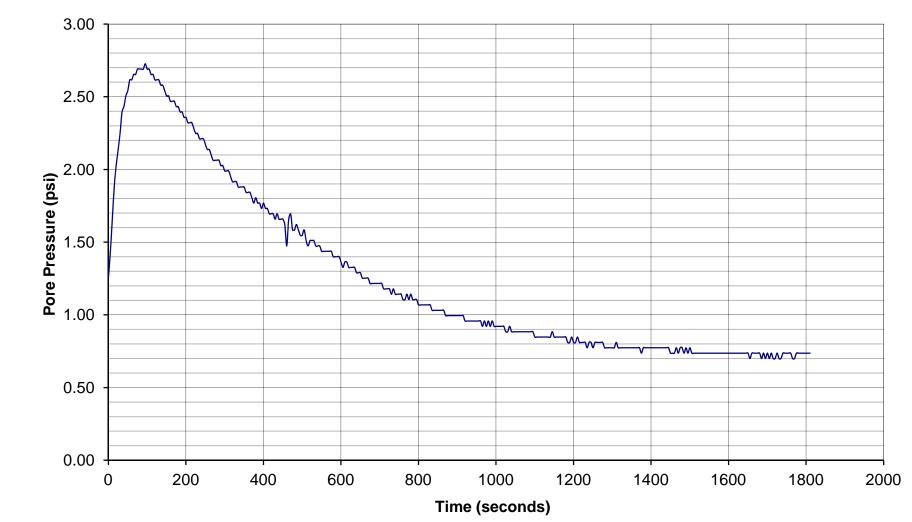
Sounding: S0009CPT
Depth: 104.99 feet
Site: Fresno
Engineer: B. Kluzniak





**Pore Pressure Dissipation Test** 

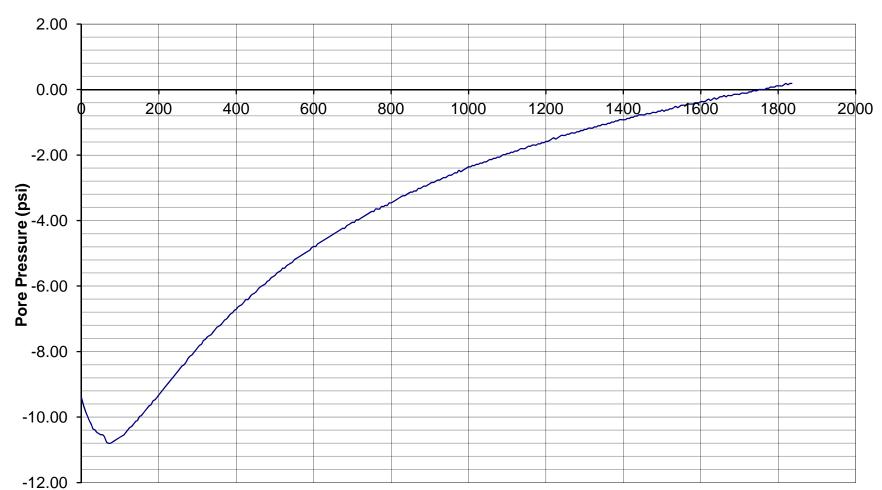
Sounding: S0009CPT
Depth: 105.81 feet
Site: Fresno
Engineer: B. Kluzniak





### **Pore Pressure Dissipation Test**

Sounding: S0012CPT
Depth: 102.2 feet
Site: Fresno
Engineer: B. Kluzniak

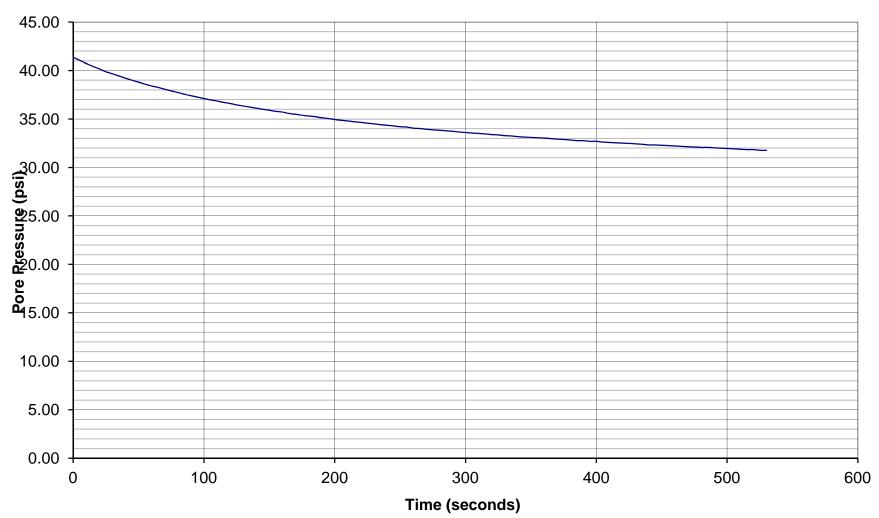


Time (seconds)



**Pore Pressure Dissipation Test** 

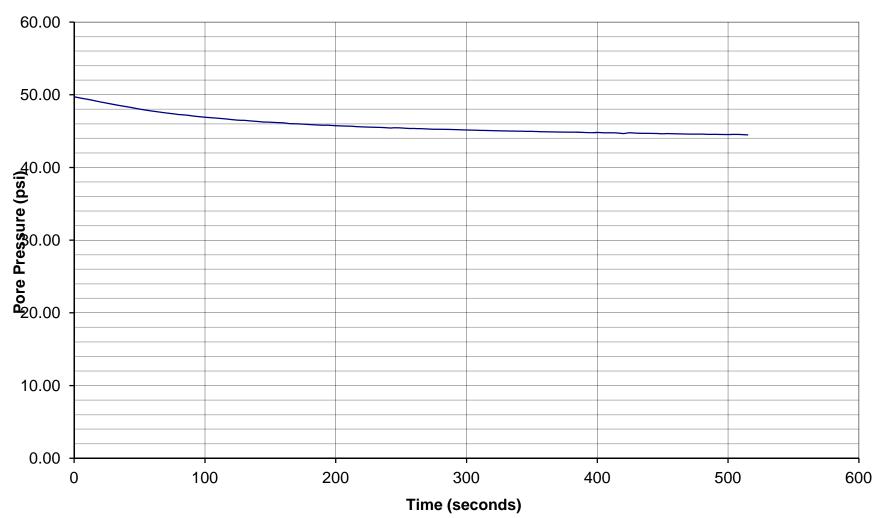
Sounding: S0016CPT
Depth: 50.36 feet
Site: Fresno
Engineer: B. Kluzniak





**Pore Pressure Dissipation Test** 

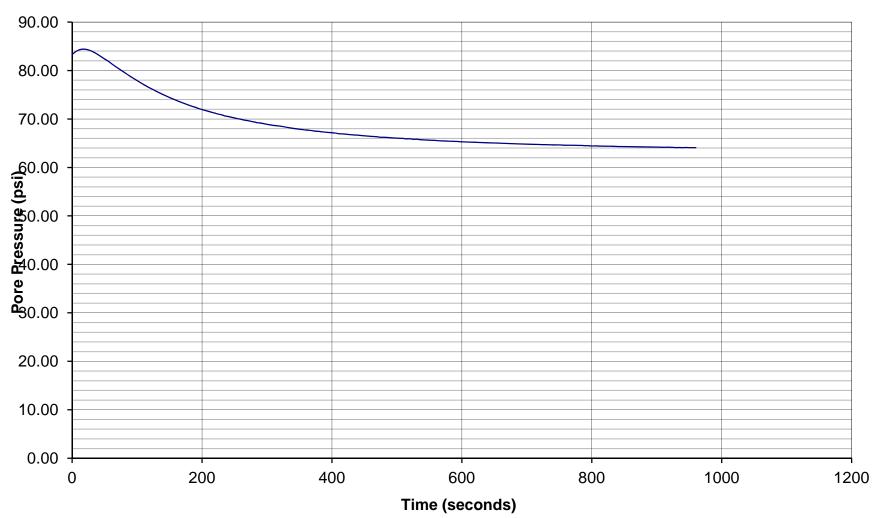
Sounding: S0022CPT
Depth: 80.05 feet
Site: Fresno
Engineer: B. Kluzniak





**Pore Pressure Dissipation Test** 

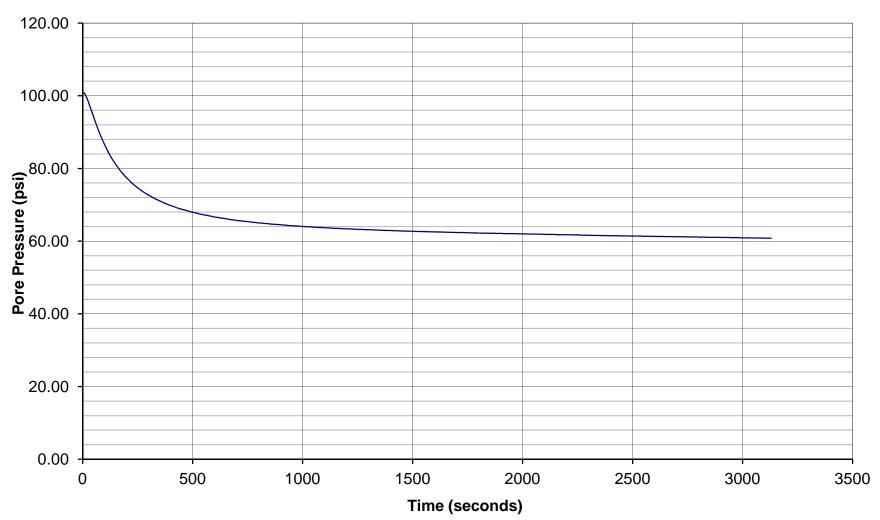
Sounding: S0023ACPT
Depth: 113.52 feet
Site: Fresno
Engineer: B. Kluzniak





**Pore Pressure Dissipation Test** 

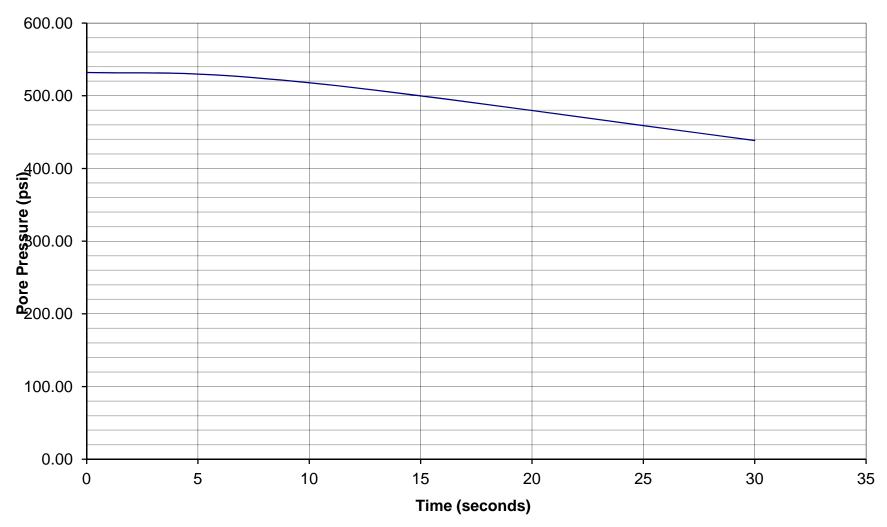
Sounding: S0023ACPT
Depth: 129.59 feet
Site: Fresno
Engineer: B. Kluzniak





**Pore Pressure Dissipation Test** 

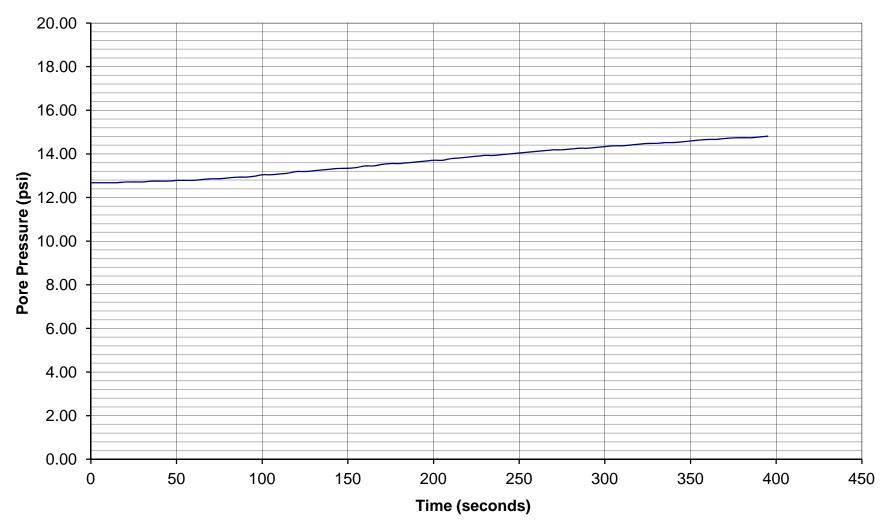
Sounding: S0023ACPT
Depth: 150.59 feet
Site: Fresno
Engineer: B. Kluzniak





**Pore Pressure Dissipation Test** 

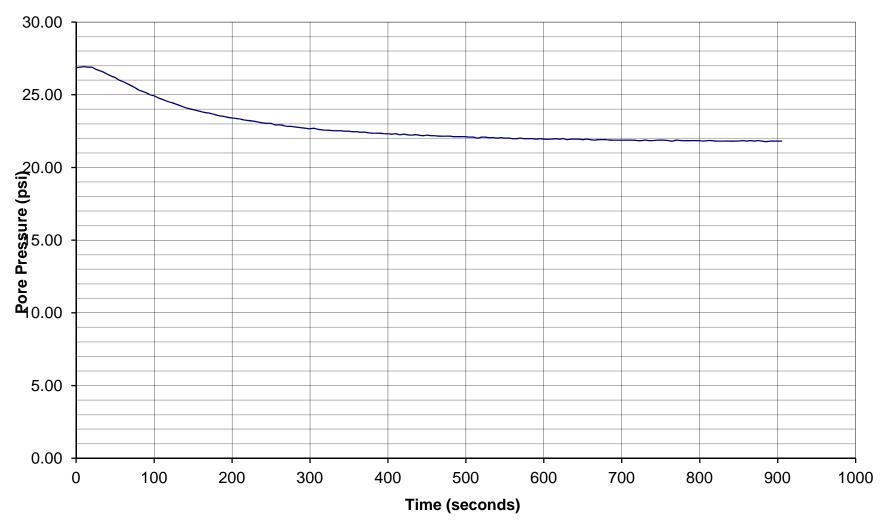
Sounding: S0024CPT
Depth: 80.05 feet
Site: Fresno
Engineer: B. Kluzniak





**Pore Pressure Dissipation Test** 

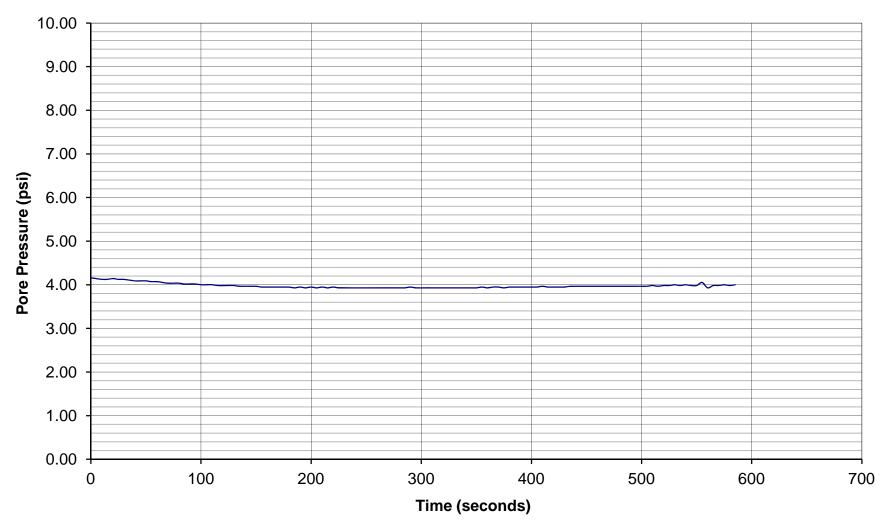
Sounding: S0025CPT
Depth: 118.44 feet
Site: Fresno
Engineer: B. Kluzniak





**Pore Pressure Dissipation Test** 

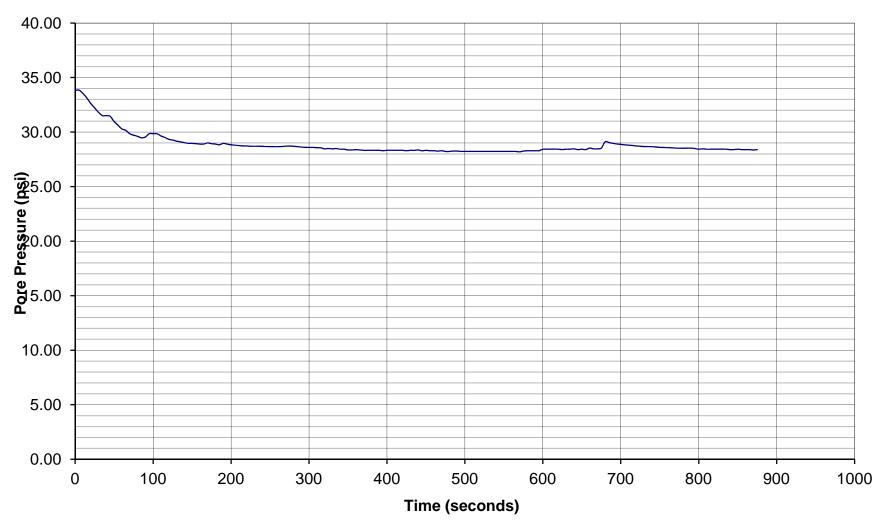
Sounding: S0029CPT
Depth: 80.05 feet
Site: Fresno
Engineer: B. Kluzniak





**Pore Pressure Dissipation Test** 

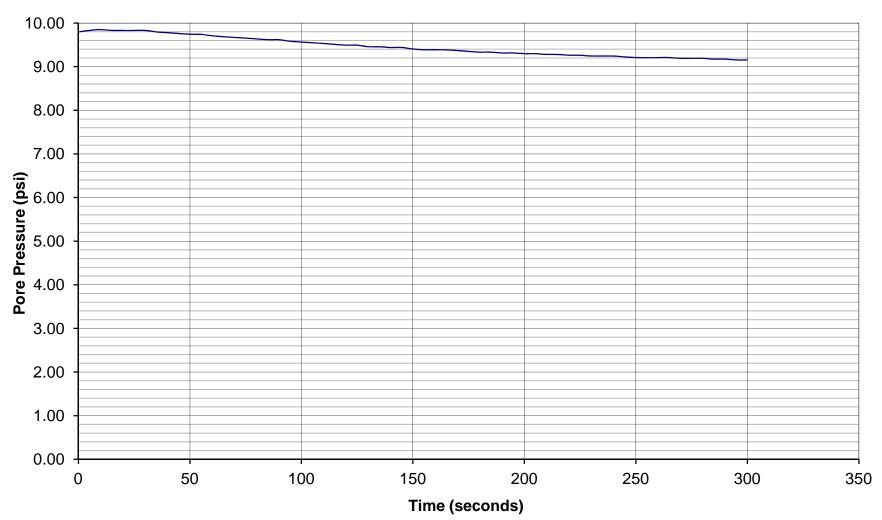
Sounding: S0031CPT
Depth: 150.43 feet
Site: Fresno
Engineer: B. Kluzniak





**Pore Pressure Dissipation Test** 

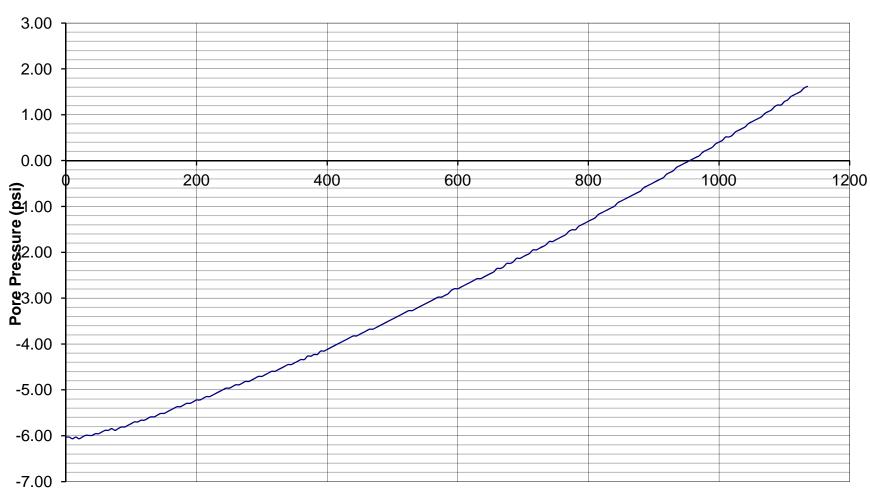
Sounding: S0032CPT
Depth: 90.22 feet
Site: Fresno
Engineer: B. Kluzniak





#### **Pore Pressure Dissipation Test**

Sounding: S0034ACPT
Depth: 95.14 feet
Site: Fresno
Engineer: B. Kluzniak

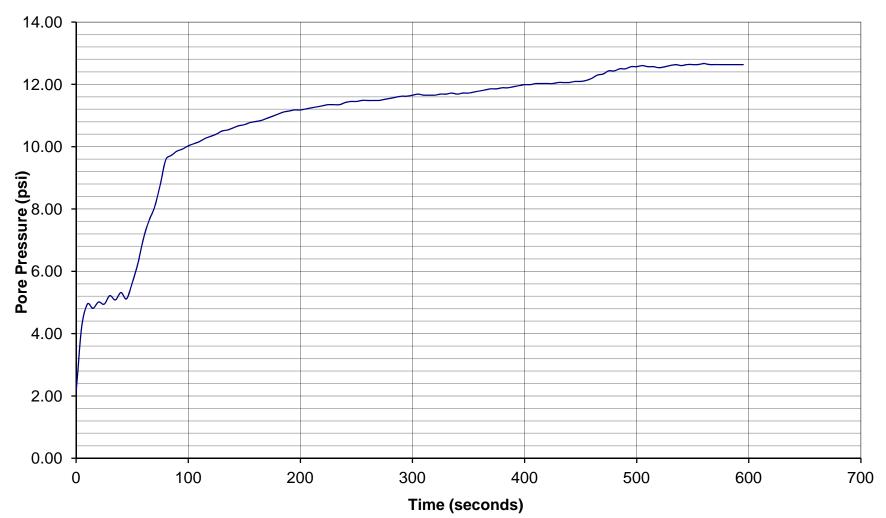


Time (seconds)



**Pore Pressure Dissipation Test** 

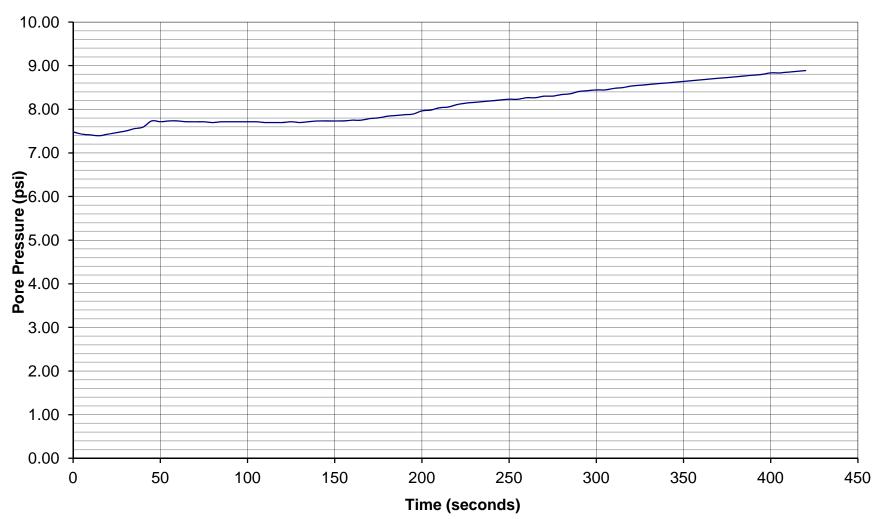
Sounding: S0035CPT
Depth: 94 feet
Site: Fresno
Engineer: B. Kluzniak





**Pore Pressure Dissipation Test** 

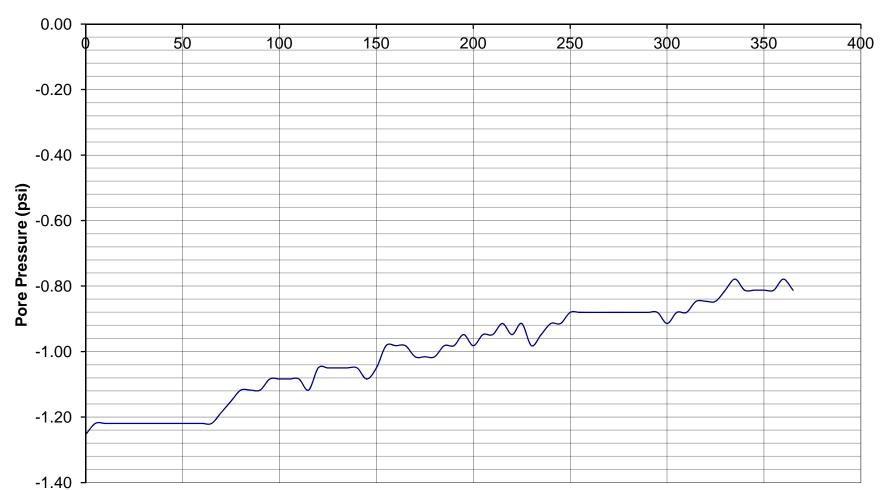
Sounding: S0036ACPT
Depth: 100.39 feet
Site: Fresno
Engineer: B. Kluzniak





**Pore Pressure Dissipation Test** 

Sounding: S0037CPT
Depth: 24.11 feet
Site: Fresno
Engineer: B. Kluzniak

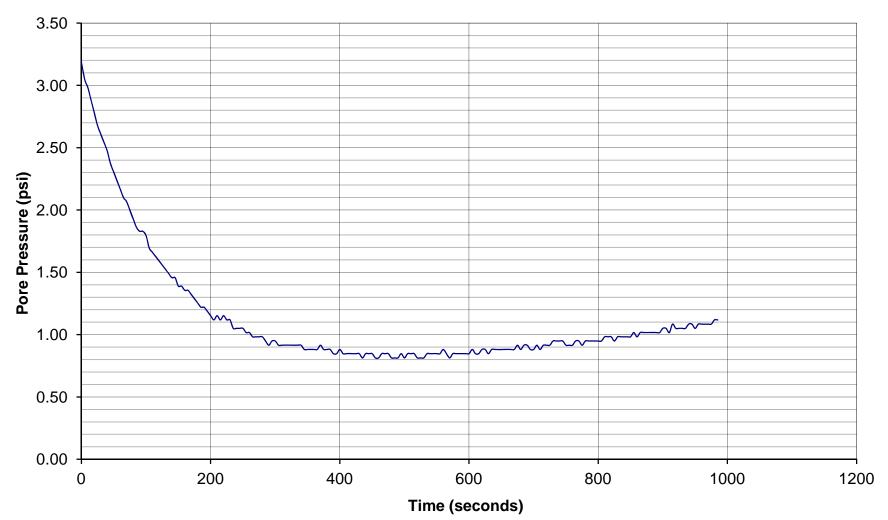


Time (seconds)



**Pore Pressure Dissipation Test** 

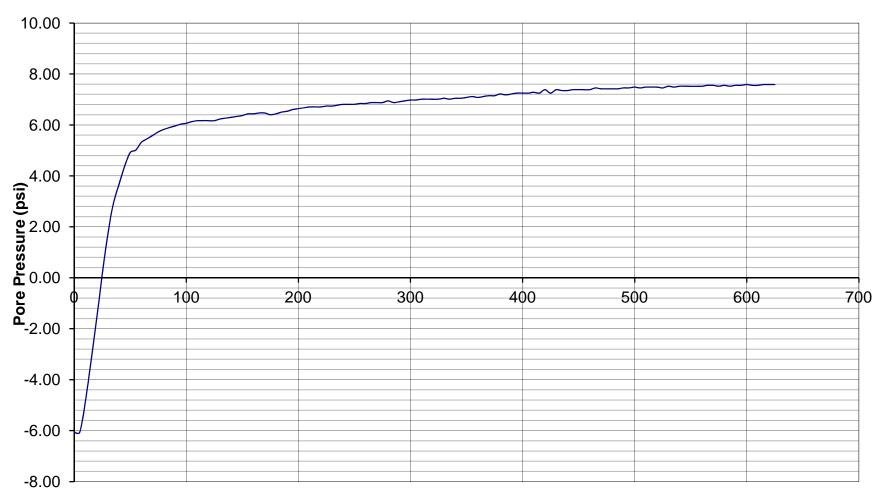
Sounding: S0037CPT
Depth: 80.05 feet
Site: Fresno
Engineer: B. Kluzniak





#### **Pore Pressure Dissipation Test**

Sounding: S0041CPT
Depth: 80.22 feet
Site: Fresno
Engineer: B. Kluzniak



Time (seconds)

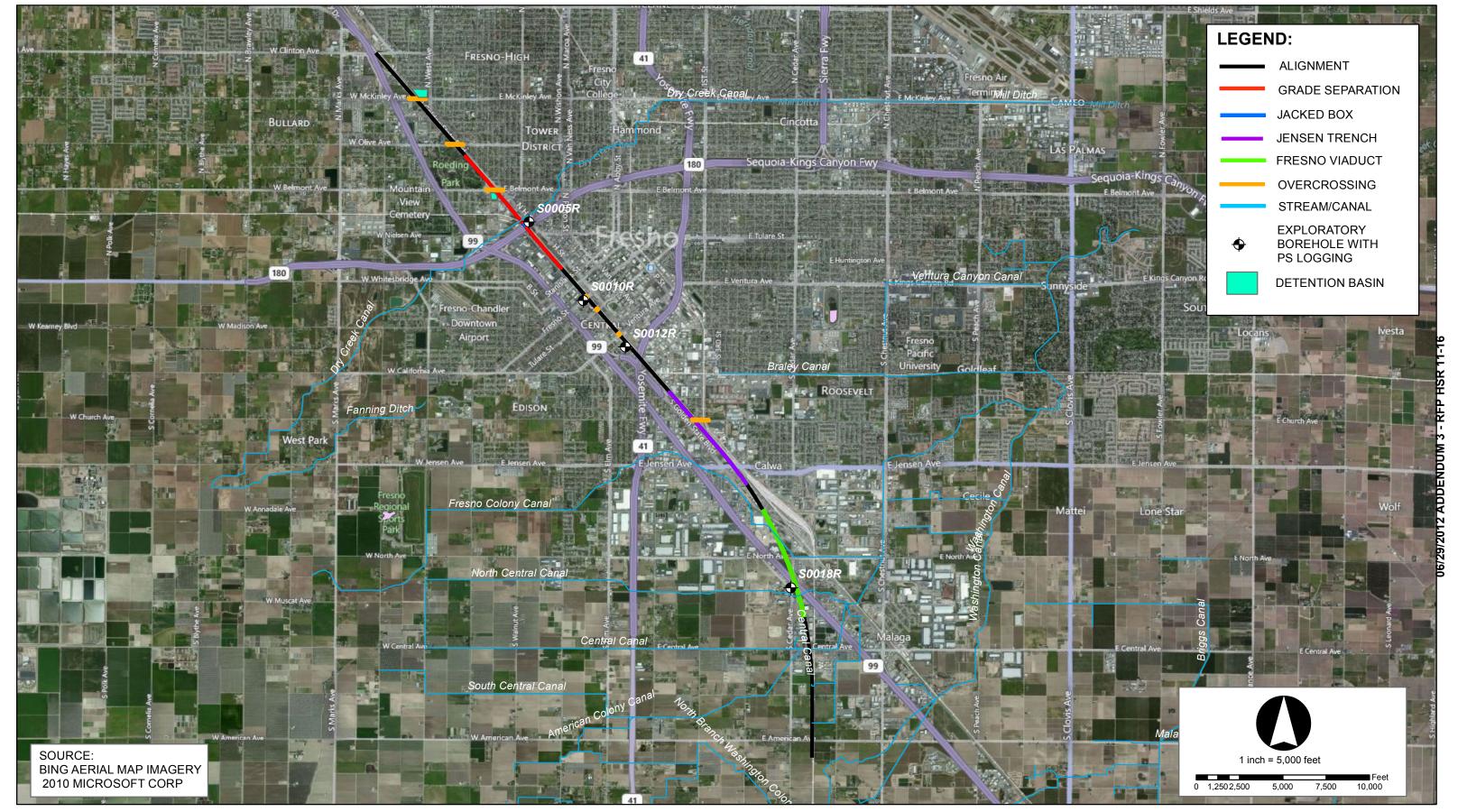
Appendix D
PS Logging Records —
GEOVision Geophysical Services

**Table D-1**Summary of PS Logging Locations, Depths, and Dates Logged

Borehole	Date	Elevation	Northing	Easting	Depth Interval <sup>[1]</sup>	
ID	Logged	(NAVD88)	(NAD83)	(NAD83)	Top Depth	<b>Bottom Depth</b>
		(ft)	(ft)	(ft)	(ft)	(ft)
S0005R	10/17/2011	285.30	2,155,457	6,325,239	6.6	82
S0010R	10/19/2011	286.10	2,150,922	6,328,342	6.6	152.6
S0012R	10/25/2011	287.60	2,148,215	6,330,774	1.6	150.9
S0018R	10/28/2011	305.80	2,134,428	6,340,369	26.3	149.3

<sup>[1]</sup> Logging performed at 1.6 foot intervals between top and bottom depths









MAP OF EXPLORATORY BOREHOLES WITH PS LOGGING
California High Speed Train
Fresno to Bakersfield
Geotechnical Data Report - Package 1



# CALIFORNIA HIGH SPEED TRAIN FRESNO TO BAKERSFIELD, BORINGS S0005R, S0010R, S0012R AND S0018R VELOCITIES

Report 11349-03 Rev 1 February 1, 2012

# CALIFORNIA HIGH SPEED TRAIN FRESNO TO BAKERSFIELD, BORINGS S0005R, S0010R, S0012R AND S0018R VELOCITIES

Report 11349-03 Rev 1 February 1, 2012

**Prepared for:** 

Gregg Drilling & Testing, Inc. 950 Howe Road Martinez, California 94553 925-313-5800

Prepared by

GEOVision Geophysical Services 1124 Olympic Drive Corona, California 92881 (951) 549-1234

# **TABLE OF CONTENTS**

TABLE OF CONTENTS	3
TABLE OF FIGURES	4
TABLE OF TABLES	4
INTRODUCTION	5
SCOPE OF WORK	5
INSTRUMENTATION	7
Suspension Instrumentation	7
MEASUREMENT PROCEDURES	10
Suspension Measurement Procedures	10
DATA ANALYSIS	11
SUSPENSION ANALYSIS	11
RESULTS	13
Suspension Results	13
SUMMARY	14
DISCUSSION OF SUSPENSION RESULTS	
QUALITY ASSURANCE	15
SUSPENSION DATA RELIABILITY	

# **Table of Figures**

Figure 1: Concept illustration of P-S logging system	16
Figure 2: Example of filtered (1400 Hz lowpass) record	17
Figure 3. Example of unfiltered record	18
Figure 4: Boring S0005R, Suspension R1-R2 P- and S <sub>H</sub> -wave velocities	19
Figure 5: Boring S0010R, Suspension R1-R2 P- and S <sub>H</sub> -wave velocities	21
Figure 6: Boring S0012R, Suspension R1-R2 P- and S <sub>H</sub> -wave velocities	23
Figure 7: Boring S0018R, Suspension R1-R2 P- and S <sub>H</sub> -wave velocities	25
Table of Tables	
Table 1. Boring locations and logging dates	5
Table 2. Logging dates and depth ranges	
Table 3. Boring S0005R, Suspension R1-R2 depths and P- and S <sub>H</sub> -wave velocities	20
Table 4. Boring S0010R, Suspension R1-R2 depths and P- and $S_{H}$ -wave velocities	22
Table 5. Boring S0012R, Suspension R1-R2 depths and P- and S <sub>H</sub> -wave velocities	24
Table 6. Boring S0018R, Suspension R1-R2 depths and P- and S <sub>H</sub> -wave velocities	26

#### **APPENDICES**

APPENDIX A SUSPENSION VELOCITY MEASUREMENT QUALITY

ASSURANCE SUSPENSION SOURCE TO RECEIVER

ANALYSIS RESULTS

APPENDIX B GEOPHYSICAL LOGGING SYSTEMS - NIST TRACEABLE CALIBRATION RECORDS

#### INTRODUCTION

Boring geophysical measurements were collected in four uncased borings located along the proposed alignment of the California High Speed Train, in Fresno, California. Geophysical data acquisition was performed on October 17, 19, 25 and 28, 2011 by Victor Gonzalez, Robert Steller and Charles Carter of **GEO** *Vision*. Data analysis and report preparation was performed by Robert Steller and reviewed by John Diehl of **GEO** *Vision*. The work was performed for ARUP, under subcontract with Gregg Drilling & Testing, Inc. (Gregg). Chris Christensen served as the point of contact for Gregg and Brandon Kluzniak served as the point of contact for ARUP.

This report describes the field measurements, data analysis, and results of this work.

#### **SCOPE OF WORK**

This report presents the results of boring geophysical measurements collected on October 17, 19, 25 and 28, 2011, in four uncased borings, as detailed below. The purpose of these studies was to supplement stratigraphic information obtained during ARUP's soil sampling program and to acquire shear wave velocities and compressional wave velocities as a function of depth.

	DATES	ELEVATION (1)	COORDINATES (FEET) (1)	
BORING	LOGGED	(NAVD88, FEET)	NORTHING	EASTING
S0005R	10/17/2011	285.26	2,155,457.49	6,325,238.59
S0010R	10/19/2011	286.12	2,150,921.78	6,328,341.74
S0012R	10/25/2011	287.57	2,148,215.47	6,330,773.97
S0018R	10/28/2011	305.75	2,134,428.02	6,340,369.12

(1) Coordinates provided by ARUP

Table 1. Boring locations and logging dates

The OYO Suspension PS Logging System (Suspension System) was used to obtain in-situ horizontal shear (S<sub>H</sub>) and compressional (P) wave velocity measurements at 1.6 foot intervals. Measurements followed **GEO***Vision* Procedure for P-S Suspension Seismic Velocity Logging, revision 1.5. The acquired data was analyzed and a profile of velocity versus depth was produced for both compressional and horizontally polarized shear waves.

A detailed reference for the suspension PS velocity measurement techniques used in this study is:

<u>Guidelines for Determining Design Basis Ground Motions</u>, Report TR-102293, Electric Power Research Institute, Palo Alto, California, November 1993, Sections 7 and 8.

#### INSTRUMENTATION

#### **Suspension Instrumentation**

Suspension soil velocity measurements were performed below the surface casing using the Suspension PS logging system, manufactured by OYO Corporation, and their subsidiary, Robertson Geologging. This system directly determines the average velocity of a 3.3-foot high segment of the soil column surrounding the boring of interest by measuring the elapsed time between arrivals of a wave propagating upward through the soil column. The receivers that detect the wave, and the source that generates the wave, are moved as a unit in the boring producing relatively constant amplitude signals at all depths.

The suspension system probe consists of a combined reversible polarity solenoid horizontal shear-wave source ( $S_H$ ) and compressional-wave source (P), joined to two biaxial receivers by a flexible isolation cylinder, as shown in Figure 1. The separation of the two receivers is 3.3 feet, allowing average wave velocity in the region between the receivers to be determined by inversion of the wave travel time between the two receivers. The total length of the probe as used in these surveys is 21 feet, with the center point of the receiver pair 12.5 feet above the bottom end of the probe.

The probe receives control signals from, and sends the digitized receiver signals to, instrumentation on the surface via an armored 7 conductor cable. The cable is wound onto the drum of a winch and is used to support the probe. Cable travel is measured to provide probe depth data, using a 3.28-foot circumference sheave fitted with a digital rotary encoder.

The entire probe is suspended in the boring by the cable, therefore, source motion is not coupled directly to the boring walls; rather, the source motion creates a horizontally propagating impulsive pressure wave in the fluid filling the boring and surrounding the source. This pressure wave is converted to P and  $S_H$ -waves in the surrounding soil and rock as it impinges upon the wall of the boring. These waves propagate through the soil and rock surrounding the boring, in

turn causing a pressure wave to be generated in the fluid surrounding the receivers as the soil waves pass their location. Separation of the P and S<sub>H</sub>-waves at the receivers is performed using the following steps:

- Orientation of the horizontal receivers is maintained parallel to the axis of the source, maximizing the amplitude of the recorded S<sub>H</sub> -wave signals.
- 2. At each depth, S<sub>H</sub>-wave signals are recorded with the source actuated in opposite directions, producing S<sub>H</sub>-wave signals of opposite polarity, providing a characteristic S<sub>H</sub>-wave signature distinct from the P-wave signal.
- 3. The 7.0-foot separation of source and receiver 1 permits the P-wave signal to pass and damp significantly before the slower S<sub>H</sub>-wave signal arrives at the receiver. In faster soils or rock, the isolation cylinder is extended to allow greater separation of the P- and S<sub>H</sub>-wave signals.
- 4. In saturated soils, the received P-wave signal is typically of much higher frequency than the received S<sub>H</sub>-wave signal, permitting additional separation of the two signals by low pass filtering.
- 5. Direct arrival of the original pressure pulse in the fluid is not detected at the receivers because the wavelength of the pressure pulse in fluid is significantly greater than the dimension of the fluid annulus surrounding the probe (meter versus centimeter scale), preventing significant energy transmission through the fluid medium.

In operation, a distinct, repeatable pattern of impulses is generated at each depth as follows:

- 1. The source is fired in one direction producing dominantly horizontal shear with some vertical compression, and the signals from the horizontal receivers situated parallel to the axis of motion of the source are recorded.
- 2. The source is fired again in the opposite direction and the horizontal receiver signals are recorded.
- 3. The source is fired again and the vertical receiver signals are recorded. The repeated source pattern facilitates the picking of the P and S<sub>H</sub>-wave arrivals; reversal of the source changes the polarity of the S<sub>H</sub>-wave pattern but not the P-wave pattern.

The data from each receiver during each source activation is recorded as a different channel on the recording system. The Suspension PS system has six channels (two simultaneous recording channels), each with a 1024 sample record. The recorded data are displayed as six channels with a common time scale. Data are stored on disk for further processing. Up to 8 sampling sequences can be summed to improve the signal to noise ratio of the signals.

Review of the displayed data on the recorder or computer screen allows the operator to set the gains, filters, delay time, pulse length (energy), sample rate, and summing number to optimize the quality of the data before recording. Verification of the calibration of the Suspension PS digital recorder is performed every twelve months using a NIST traceable frequency source and counter, as outlined in Appendix B.

#### MEASUREMENT PROCEDURES

#### **Suspension Measurement Procedures**

The borings were logged while filled with bentonite or polymer based drilling mud. Measurements followed the **GEO**Vision Procedure for P-S Suspension Seismic Velocity Logging, revision 1.5. The probe was positioned with the mid-point of the receivers at ground level, and the depth value was set to zero, in order to reference all depths to ground level. The probe was lowered to the bottom of the boring, stopping at 1.6 foot intervals to collect data, as summarized in Table 2.

At each measurement depth the measurement sequence of two opposite horizontal records and one vertical record was performed, and the gains were adjusted as required. The data from each depth were viewed on the computer display, checked, and recorded on disk before moving to the next depth.

Upon completion of the measurements, the probe zero depth indication at the depth reference point was verified prior to removal from the boring.

BORING NUMBER	TOOL AND RUN NUMBER	DEPTH RANGE (FEET)	OPEN HOLE (FEET)	DEPTH TO BOTTOM OF CASING (FEET)	SAMPLE INTERVAL (FEET)	DATE LOGGED
S0005R	SUSPENSION 1	6.6 – 82.0	94.5	5	1.6	10/17/2011
S0010R	SUSPENSION 1	6.6 – 152.6	165.1	5	1.6	10/19/2011
S0012R	SUSPENSION 1	1.6 – 150.9	163.5	NONE	1.6	10/25/2011
S0018R	SUSPENSION 1	26.3 – 149.3	161.8	25	1.6	10/28/2011

- PROBE DID NOT TOUCH BOTTOM OF BORING

Table 2. Logging dates and depth ranges

#### **DATA ANALYSIS**

#### **Suspension Analysis**

Using the proprietary OYO program PSLOG.EXE version 1.0, the recorded digital waveforms were analyzed to locate the most prominent first minima, first maxima, or first break on the vertical axis records, indicating the arrival of P-wave energy. The difference in travel time between receiver 1 and receiver 2 (R1-R2) arrivals was used to calculate the P-wave velocity for that 3.3-foot segment of the soil column. When observable, P-wave arrivals on the horizontal axis records were used to verify the velocities determined from the vertical axis data. The time picks were then transferred into an EXCEL template (EXCEL version 2003 SP2) to complete the velocity calculations based upon the arrival time picks made in PSLOG.

The P-wave velocity over the 7.0-foot interval from source to receiver 1 (S-R1) was also picked using PSLOG, and calculated and plotted in EXCEL, for quality assurance of the velocity derived from the travel time between receivers. In this analysis, the depth values as recorded were increased by 5.2 feet to correspond to the mid-point of the 7.0-foot S-R1 interval. Travel times were obtained by picking the first break of the P-wave signal at receiver 1 and subtracting 4 milliseconds, the calculated and experimentally verified delay from source trigger pulse (beginning of record) to source impact. This delay corresponds to the duration of acceleration of the solenoid before impact.

As with the P-wave records, using PSLOG, the recorded digital waveforms were analyzed to locate the presence of clear  $S_H$ -wave pulses, as indicated by the presence of opposite polarity pulses on each pair of horizontal records. Ideally, the  $S_H$ -wave signals from the 'normal' and 'reverse' source pulses are very nearly inverted images of each other. Digital FFT - IFFT lowpass filtering was used to remove the higher frequency P-wave signal from the  $S_H$ -wave signal. Different filter cutoffs were used to separate P- and  $S_H$ -waves at different depths, ranging from 600 Hz in the slowest zones to 2000 Hz in the regions of highest velocity. At each

depth, the filter frequency was selected to be at least twice the fundamental frequency of the S<sub>H</sub>-wave signal being filtered.

Generally, the first maxima were picked for the 'normal' signals and the first minima for the 'reverse' signals, although other points on the waveform were used if the first pulse was distorted. The absolute arrival time of the 'normal' and 'reverse' signals may vary by +/- 0.2 milliseconds, due to differences in the actuation time of the solenoid source caused by constant mechanical bias in the source or by boring inclination. This variation does not affect the R1-R2 velocity determinations, as the differential time is measured between arrivals of waves created by the same source actuation. The final velocity value is the average of the values obtained from the 'normal' and 'reverse' source actuations.

As with the P-wave data, S<sub>H</sub>-wave velocity calculated from the travel time over the 7.0-foot interval from source to receiver 1 was calculated and plotted for verification of the velocity derived from the travel time between receivers. In this analysis, the depth values were increased by 5.2 feet to correspond to the mid-point of the 7.0-foot S-R1 interval. Travel times were obtained by picking the first break of the S<sub>H</sub>-wave signal at the near receiver and subtracting 4 milliseconds, the calculated and experimentally verified delay from the beginning of the record at the source trigger pulse to source impact. These data and analysis were reviewed by John Diehl as a component of **GEO***Vision*'s in-house QA-QC program.

Figure 2 shows an example of R1 - R2 measurements on a sample filtered suspension record. In Figure 2, the time difference over the 3.3-foot interval of 1.88 milliseconds for the horizontal signals is equivalent to an  $S_H$ -wave velocity of 1745 feet/second. Whenever possible, time differences were determined from several phase points on the  $S_H$ -waveform records to verify the data obtained from the first arrival of the  $S_H$ -wave pulse. Figure 3 displays the same record before filtering of the  $S_H$ -waveform record with a 1400 Hz FFT - IFFT digital lowpass filter, illustrating the presence of higher frequency P-wave energy at the beginning of the record, and distortion of the lower frequency  $S_H$ -wave by residual P-wave signal.

#### **RESULTS**

#### **Suspension Results**

Suspension R1-R2 P- and  $S_H$ -wave velocities are plotted in Figures 4 through 7. The suspension velocity data presented in these figures are presented in Tables 3 through 6. These plots and data are included in the EXCEL analysis files accompanying this report.

P- and S<sub>H</sub>-wave velocity data from R1-R2 analysis and quality assurance analysis of S-R1 data are plotted together in Figures A-1 through A-4 to aid in visual comparison. It should be noted that R1-R2 data are an average velocity over a 3.3-foot segment of the soil column; S-R1 data are an average over 7.0 feet, creating a significant smoothing relative to the R1-R2 plots. S-R1 data are presented in Tables A-1 through A-4, and included in the EXCEL analysis files.

Calibration procedures and records for the suspension PS measurement system are presented in Appendix B.

#### **SUMMARY**

#### **Discussion of Suspension Results**

Suspension PS velocity data are ideally collected in uncased fluid filled borings, drilled with rotary mud (rotary wash) methods. These borings were ideal for collection of suspension PS velocity data.

Suspension PS velocity data quality is judged based upon 5 criteria:

- 1. Consistent data between receiver to receiver (R1 − R2) and source to receiver (S − R1) data.
- 2. Consistent relationship between P-wave and S<sub>H</sub> -wave (excluding transition to saturated soils)
- 3. Consistency between data from adjacent depth intervals.
- 4. Clarity of P-wave and S<sub>H</sub>-wave onset, as well as damping of later oscillations.
- 5. Consistency of profile between adjacent borings, if available.

These data show good correlation between R1 - R2 and S - R1 data, as well as good correlation between P-wave and  $S_H$ -wave velocities. P-wave and  $S_H$ -wave onsets are generally clear, and later oscillations are well damped.

#### **Quality Assurance**

These boring geophysical measurements were performed using industry-standard or better methods for measurements and analyses. All work was performed under **GEO***Vision* quality assurance procedures, which include:

- Use of NIST-traceable calibrations, where applicable, for field and laboratory instrumentation
- Use of standard field data logs
- Use of independent verification of velocity data by comparison of receiver-to-receiver and source-to-receiver velocities
- Independent review of calculations and results by a registered professional engineer, geologist, or geophysicist.

#### **Suspension Data Reliability**

P- and  $S_H$ -wave velocity measurement using the Suspension Method gives average velocities over a 3.3-foot interval of depth. This high resolution results in the scatter of values shown in the graphs. Individual measurements are very reliable with estimated precision of  $\pm$ -5%. Standardized field procedures and quality assurance checks contribute to the reliability of these data.

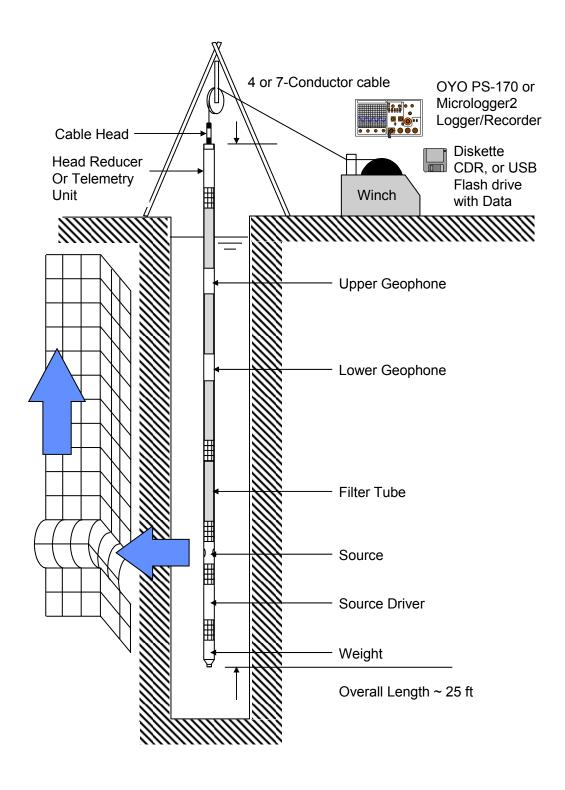


Figure 1: Concept illustration of P-S logging system

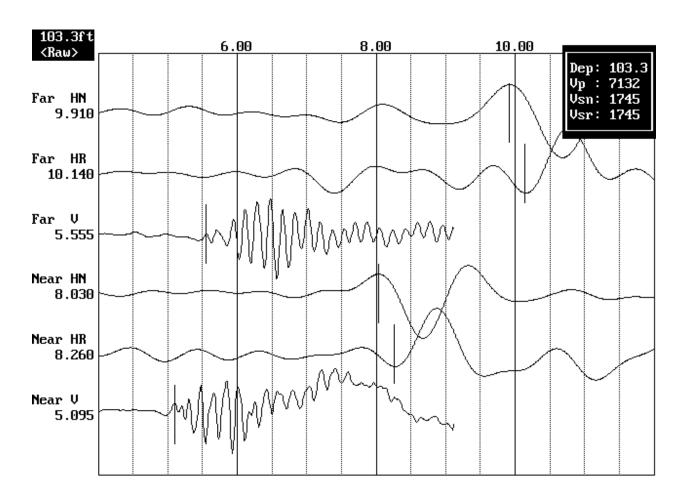


Figure 2: Example of filtered (1400 Hz lowpass) record

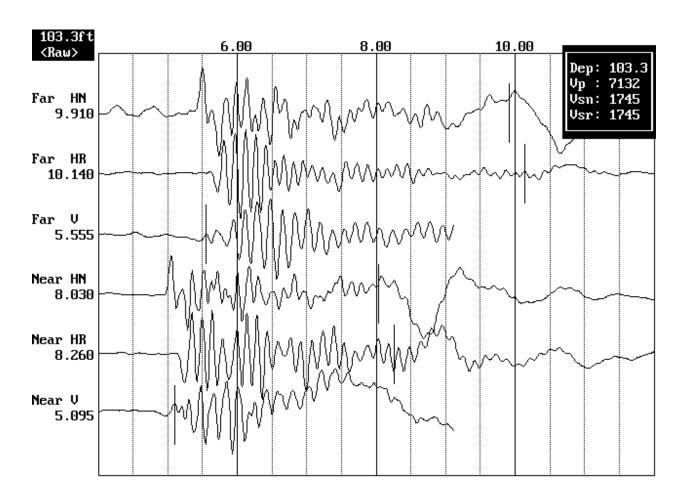


Figure 3. Example of unfiltered record

# CALIFORNIA HIGH SPEED RAIL BORING S0005R Receiver to Receiver $V_s$ and $V_p$ Analysis

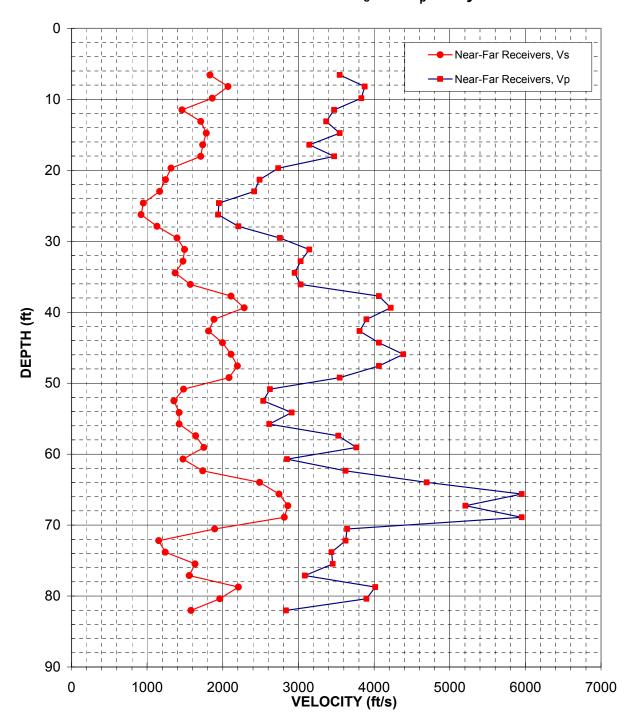


Figure 4: Boring S0005R, Suspension R1-R2 P- and S<sub>H</sub>-wave velocities

Depth	$V_s$	V <sub>p</sub>
(feet)	(feet/sec)	(feet/sec)
	1830	3550
6.6		
8.2	2070	3880
9.8	1860	3830 3470
11.5	1460	
13.1	1710	3370
14.8	1780	3550
16.4	1740	3140
18.0	1710	3470
19.7	1320	2730
21.3	1240	2490
23.0	1170	2420
24.6	950	1950
26.3	920	1940
27.9	1130	2210
29.5	1390	2750
31.2	1490	3140
32.8	1470	3030
34.5	1370	2950
36.1	1570	3030
37.7	2110	4070
39.4	2280	4220
41.0	1880	3900
42.7	1810	3810
44.3	2000	4070
45.9	2110	4390
47.6	2190	4070
49.2	2080	3550
50.9	1480	2620
52.5	1360	2530
54.1	1420	2910
55.8	1420	2610
57.4	1640	3530
59.1	1750	3770
60.7	1470	2850
62.3	1740	3620
64.0	2490	4690
65.6	2740	5950
67.3	2860	5210
68.9	2810	5950
70.5	1890	3640
72.2	1150	3620
73.8	1240	3440
75.5	1630	3450
77.1	1560	3090
78.7	2210	4020
80.4	1960	3900
82.0	1580	2840
52.0	.555	

Table 3. Boring S0005R, Suspension R1-R2 depths and P- and  $S_{H}$ -wave velocities

# CALIFORNIA HIGH SPEED RAIL BORING S0010R Receiver to Receiver $V_s$ and $V_p$ Analysis

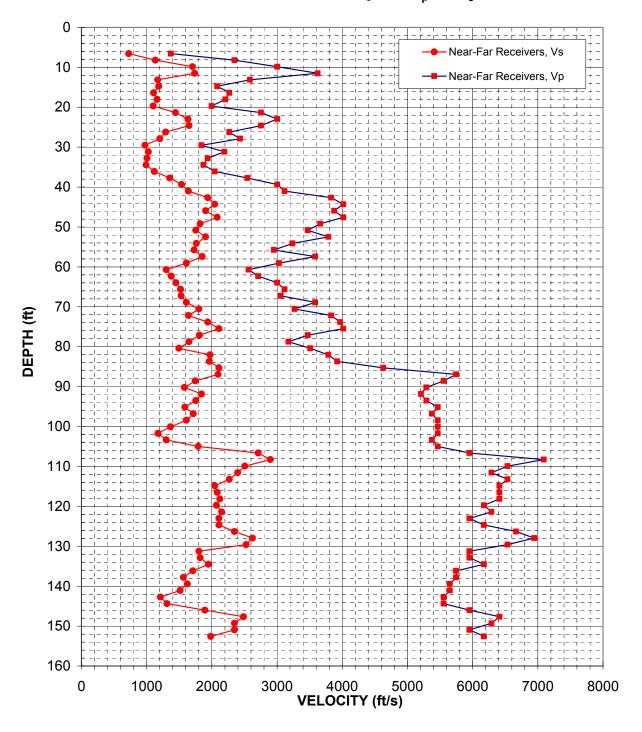


Figure 5: Boring S0010R, Suspension R1-R2 P- and S<sub>H</sub>-wave velocities

	I v	l v	1 1		I v	
Depth	V <sub>s</sub>	V <sub>p</sub>		Depth	V <sub>s</sub>	<b>V</b> <sub>p</sub>
(feet)	(feet/sec)	(feet/sec)	1	(feet)	(feet/sec)	(feet/sec)
6.6	720	1370	1	88.6	1750	5560
8.2	1130	2350		90.2	1580	5290
9.8	1710	3000		91.9	1840	5210
11.5	1740	3620		93.5	1750	5290
13.1	1170	2580	4	95.1	1590	5460
14.8	1190	2080	H	96.8	1720	5380
16.4	1110	2270	1 1	98.4	1610	5460
18.0	1160	2210	l	100.1	1370	5460
19.7	1100	2000		101.7	1170	5460
21.3	1440	2750	l	103.4	1300	5380
23.0	1630	3000		105.0	1790	5460
24.6	1650	2750		106.6	2710	5950
26.3	1290	2270		108.3	2900	7090
27.9	1200	2430		109.9	2510	6540
29.5	970	1840		111.6	2400	6290
31.2	1030	2190		113.2	2270	6540
32.8	1010	1940		114.8	2040	6410
34.5	990	1870		116.5	2080	6410
36.1	1120	2040		118.1	2120	6410
37.7	1360	2540		119.8	2070	6170
39.4	1540	3000		121.4	2150	6290
41.0	1640	3120		123.0	2110	5950
42.7	1940	3830		124.7	2110	6170
44.3	2040	4020		126.3	2350	6670
45.9	1900	3880		128.0	2620	6940
47.6	2080	4020		129.6	2530	6540
49.2	1820	3660		131.2	1800	5950
50.9	1750	3470		132.9	1820	5950
52.5	1900	3790		134.5	1950	6170
54.1	1760	3240		136.2	1710	5750
55.8	1730	2950		137.8	1560	5750
57.4	1850	3580		139.4	1630	5650
59.1	1610	3030		141.1	1520	5650
60.7	1300	2560		142.7	1210	5560
62.3	1380	2710		144.4	1310	5560
64.0	1450	3000		146.0	1890	5950
65.6	1520	3120		147.6	2490	6410
67.3	1530	3060	1	149.3	2350	6290
68.9	1610	3580	1	150.9	2350	5950
70.5	1800	3270		152.6	1980	6170
72.2	1640	3830				
73.8	1940	3970	Ι'			
75.5	2110	4020				
77.1	1810	3470				
78.7	1650	3170				
80.4	1490	3510				

Table 4. Boring S0010R, Suspension R1-R2 depths and P- and S<sub>H</sub>-wave velocities

3920

4630

5750

1970

1960

2110

2100

82.0

83.7

85.3

86.9

# CALIFORNIA HIGH SPEED RAIL BORING S0012R Receiver to Receiver $V_s$ and $V_p$ Analysis

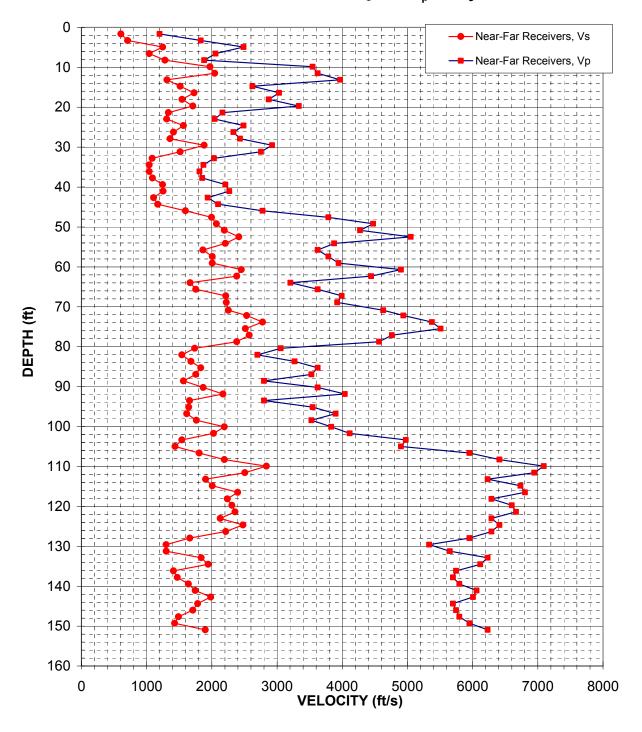


Figure 6: Boring S0012R, Suspension R1-R2 P- and S<sub>H</sub>-wave velocities

Depth	$V_s$	$V_p$	Depth	$V_s$	$V_p$
(feet)	(feet/sec)	(feet/sec)	(feet)	(feet/sec)	(feet/sec)
1.6	610	1200	83.7	1680	3270
3.3	710	1830	85.3	1830	3620
4.9	1250	2490	86.9	1750	3530
6.6	1040	2060	88.6	1560	2800
8.2	1280	1880	90.2	1870	3620
9.8	1970	3550	91.9	2170	4040
11.5	2040	3620	93.5	1660	2800
13.1	1310	3970	95.1	1650	3550
14.8	1520	2620	96.8	1610	3900
16.4	1730	3030	98.4	1760	3530
18.0	1540	2870	100.1	2190	3830
19.7	1710	3330	101.7	2030	4120
21.3	1330	2160	103.4	1540	4980
23.0	1310	2040	105.0	1440	4900
24.6	1560	2490	106.6	1810	5950
26.3	1410	2330	108.3	2190	6410
27.9	1360	2430	109.9	2840	7090
29.5	1880	2920	111.6	2510	6940
31.2	1520	2750	113.2	1900	6230
32.8	1090	2030	114.8	2010	6730
34.5	1040	1870	116.5	2400	6800
36.1	1040	1810	118.1	2240	6290
37.7	1090	1850	119.8	2310	6600
39.4	1240	2210	121.4	2360	6670
41.0	1250	2270	123.0	2130	6290
42.7	1110	1940	124.7	2480	6410
44.3	1170	2100	126.3	2210	6290
45.9	1590	2780	128.0	1660	5950
47.6	2000	3790	129.6	1300	5330
49.2	2070	4470	131.2	1300	5650
50.9	2190	4270	132.9	1840	6230
52.5	2420	5050	134.5	1940	6120
54.1	2210	3880	136.2	1410	5750
55.8	1860	3620	137.8	1470	5700
57.4	2010	3790	139.4	1640	5800
59.1	2010	3940	141.1	1750	6060
60.7	2450	4900	142.7	1980	6010
62.3	2380	4440	144.4	1780	5700
64.0	1670	3210	146.0	1710	5750
65.6	1750	3620	147.6	1490	5800
67.3	2210	3990	149.3	1430	5950
68.9	2220	3920	150.9	1900	6230
70.9	2250	4630			
72.2	2530	4940		-	•
73.8	2780	5380			
75.5	2520	5510			
77.1	2570	4760			
78.7	2380	4570			
80.4	1740	3060			
82.0	1540	2700			

Table 5. Boring S0012R, Suspension R1-R2 depths and P- and S<sub>H</sub>-wave velocities

1540

82.0

# CALIFORNIA HIGH SPEED RAIL BORING S0018R Receiver to Receiver $V_s$ and $V_p$ Analysis

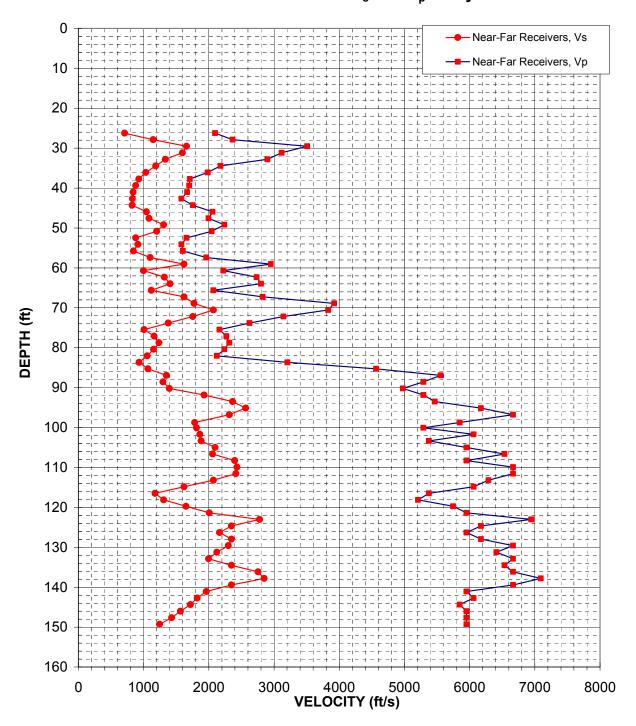


Figure 7: Boring S0018R, Suspension R1-R2 P- and S<sub>H</sub>-wave velocities

	1 1/	1 ,,
Depth	V <sub>s</sub>	V <sub>p</sub>
(feet)	(feet/sec)	(feet/sec)
26.3	710	2100
27.9	1150	2360
29.5	1660	3510
31.2	1590	3120
32.8	1330	2900
34.5	1190	2180
36.1	1030	1980
37.7	930	1710
39.4	880	1700
41.0	840	1670
42.7	830	1580
44.3	820	1750
45.9	1040	2060
47.6	1080	2000
49.2	1310	2240
50.9	1200	2040
52.5	880	1660
54.1	910	1580
55.8	840	1600
57.4	1100	1960
59.1	1620	2950
60.7	1000	2220
62.3	1320	2730
64.0	1410	2800
65.6	1120	2070
67.3	1620	2820
68.9	1770	3920
70.5	2070	3830
72.2	1750	3140
73.8	1380	2620
75.5	1010	2160
77.1	1160	2270
78.7	1230	2310
80.4	1150	2240
82.0	1050	2120
83.7	930	3210
85.3	1060	4570
86.9	1350	5560
88.6	1300	5290
90.2	1390	4980
91.9	1930	5290
93.5	2360	5460
95.1	2560	6170
96.8	2310	6670
98.8	1780	5850
100.1	1810	5290
101.7	1860	6060
103.4	1880	5380
105.0	2100	5950
106.6	2060	6540

Depth	V <sub>s</sub>	$V_p$
(feet)	(feet/sec)	(feet/sec)
108.3	2400	5950
109.9	2430	6670
111.6	2420	6670
113.2	2070	6290
114.8	1620	6060
116.5	1170	5380
118.1	1310	5210
119.8	1650	5750
121.4	2010	5950
123.0	2780	6940
124.7	2350	6170
126.3	2160	5950
128.0	2350	6170
129.6	2300	6670
131.2	2120	6410
132.9	2000	6670
134.5	2350	6540
136.2	2750	6670
137.8	2850	7090
139.4	2350	6670
141.1	1960	5950
142.7	1820	6060
144.4	1720	5850
146.0	1560	5950
147.6	1430	5950
149.3	1240	5950

Table 6. Boring S0018R, Suspension R1-R2 depths and P- and S<sub>H</sub>-wave velocities

### **APPENDIX A**

# SUSPENSION VELOCITY MEASUREMENT QUALITY ASSURANCE SUSPENSION SOURCE TO RECEIVER ANALYSIS RESULTS

### **CALIFORNIA HIGH SPEED RAIL BORING S0005R**Source to Receiver and Receiver to Receiver Analysis

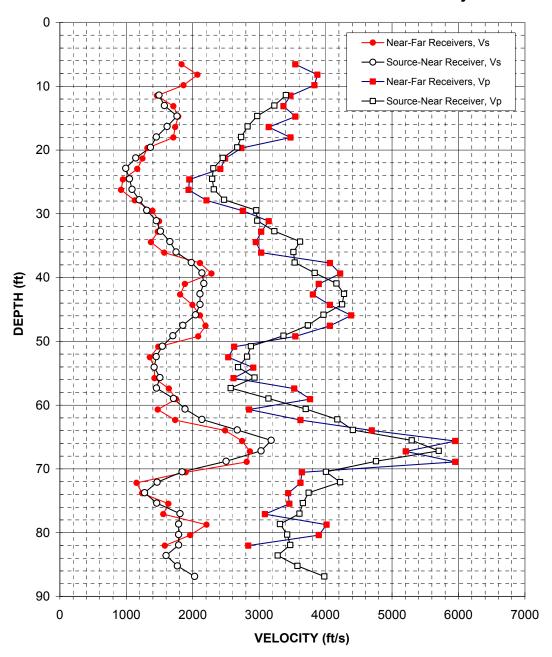


Figure A-1. Boring S0005R, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and  $S_H$ -wave data

Depth	$V_s$	$V_p$
(feet)	(feet/sec)	(feet/sec)
11.4	1490	3400
13.0	1570	3230
14.7	1760	2970
16.3	1610	2830
18.0	1450	2730
19.6	1360	2670
21.2	1140	2450
22.9	990	2310
24.5	1050	2290
26.2	1090	2320
27.8	1190	2470
29.4	1310	2960
31.1	1450	2970
32.7	1510	3230
34.4	1660	3620
36.0	1750	3520
37.6	1980	3540
39.3	2140	3840
40.9	2170	4160
42.6	2110	4280
44.2	2110	4250
45.8	2040	3970
47.5	1850	3730
49.1	1700	3370
50.8	1540	2880
52.4	1450	2820
54.0	1420	2680
55.7	1510	2930
57.3	1460	2570
59.0	1710	3140
60.6	1880	3700
62.2	2140	4180
63.9	2670	4410
65.5	3180	5300
67.2	3030	5700
68.8	2500	4760
70.5	1840	4010
72.1	1470	4220
73.7	1280	3750
75.4	1460	3660
77.0	1810	3610
78.7	1790	3310
80.3	1790	3420
81.9	1790	3470
83.6	1600	3280
85.2	1770	3580
86.9	2030	3980
55.5		5555

Table A-1. Boring S0005R, S - R1 quality assurance analysis P- and  $S_H$ -wave data

# **CALIFORNIA HIGH SPEED RAIL BORING S0010R**Source to Receiver and Receiver to Receiver Analysis

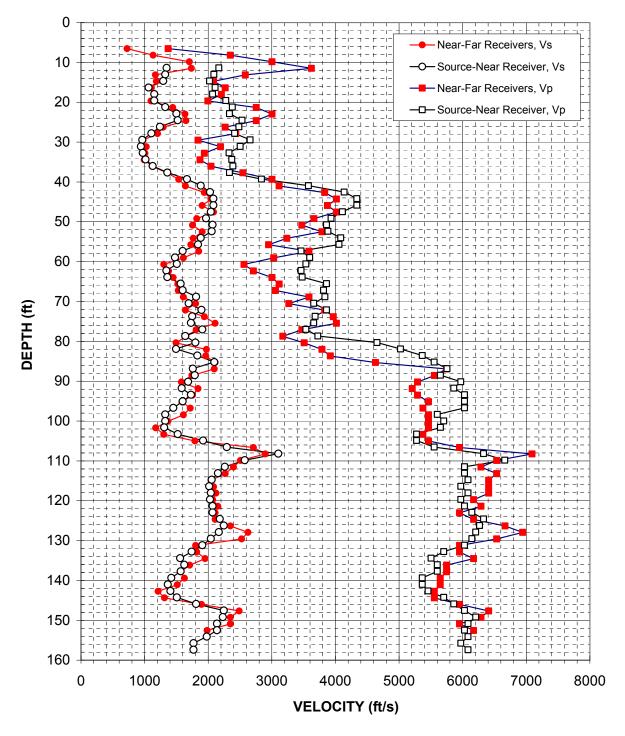


Figure A-2. Boring S0010R, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and  $S_H$ -wave data

			_			
Depth	V <sub>s</sub>	V <sub>p</sub>		pth	V <sub>s</sub>	V <sub>p</sub>
(feet)	(feet/sec)	(feet/sec)	(fe	eet)	(feet/sec)	(feet/sec)
11.4	1350	2170		3.4	1730	6030
13.0	1320	2090	9	5.1	1600	6030
14.7	1290	2020		6.7	1450	6030
16.3	1060	2110		3.3	1320	5600
18.0	1150	2070	10	0.0	1320	5700
19.6	1150	2280		1.6	1310	5650
21.2	1320	2380	10	3.3	1520	5280
22.9	1500	2340	10	4.9	1920	5280
24.5	1520	2530	10	6.5	2290	5550
26.2	1240	2480	10	8.2	3100	6330
27.8	1110	2420	10	9.8	2570	6660
29.4	960	2660	11	1.5	2260	6030
31.1	940	2500	11	3.1	2150	6030
32.7	970	2330	11	4.7	2060	6090
34.4	1010	2370	11	6.4	2020	5970
36.0	1130	2390	11	8.0	2040	6090
37.6	1360	2340	11	9.7	2030	5970
39.3	1670	2840	12	1.3	2070	6030
40.9	1880	3580	12	2.9	2070	6150
42.6	2030	4140	12	4.6	2180	6330
44.2	2080	4340	12	6.2	2240	6270
45.8	2080	4340	12	7.9	2170	6210
47.5	2040	4110	12	9.5	2040	6150
49.1	1970	3930	13	1.1	1910	6030
50.8	2070	3860	13	2.8	1740	5700
52.4	2060	3880	13	4.4	1560	5500
54.0	1880	4080	13	6.1	1620	5600
55.7	1840	4060	13	7.7	1570	5600
57.3	1600	3460	13	9.3	1420	5360
59.0	1480	3600	14	1.0	1360	5360
60.6	1510	3540	14	2.6	1410	5460
62.2	1340	3460	14	4.3	1510	5700
63.9	1360	3480	14	5.9	1810	5860
65.5	1570	3860	14	7.6	2240	6030
67.2	1600	3810	14	9.2	2230	6210
68.8	1810	3840	15	8.0	2140	6090
70.5	1690	3660	15	2.5	2140	6030
72.1	1900	3860	15	4.1	1980	6090
73.7	1750	3680	15	5.8	1770	5970
75.4	1730	3660	15	7.4	1770	6090
77.0	1910	3540				
78.7	1640	3720				
80.3	1800	4650				
81.9	1490	5020				
83.6	1830	5360				
	0.400		l			

Table A-2. Boring S0010R, S - R1 quality assurance analysis P- and S<sub>H</sub>-wave data

5750

5650

5970

5860

2100

1760

1790

1680

1580

85.2

86.9

88.5

90.1 91.8

# **CALIFORNIA HIGH SPEED RAIL BORING S0012R**Source to Receiver and Receiver to Receiver Analysis

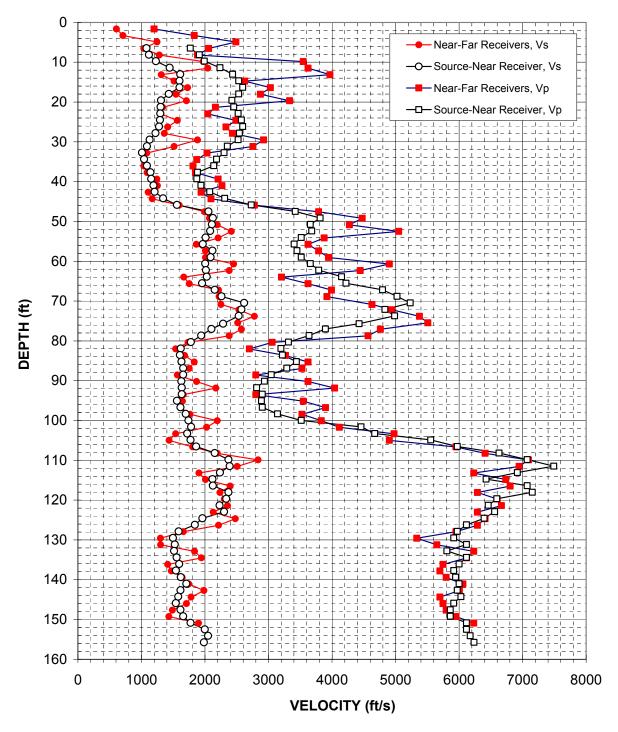


Figure A-3. Boring S0012R, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and  $S_H$ -wave data

Depth	$V_s$	$V_p$	1	Depth	V <sub>s</sub>	$V_p$
(feet)	(feet/sec)	(feet/sec)		(feet)	(feet/sec)	(feet/sec)
6.5	1080	1770		88.5	1660	3040
8.1	1120	1910		90.1	1630	2940
9.8	1230	1990		91.8	1640	2810
11.4	1450	2240		93.4	1640	2900
13.0	1610	2430		95.1	1560	2890
14.7	1600	2530		96.7	1610	2900
16.3	1600	2590		98.3	1700	3140
18.0	1430	2530		100.0	1740	3520
19.6	1310	2430		101.6	1780	4460
21.2	1300	2450		103.3	1720	4670
22.9	1300	2520		104.9	1770	5550
24.5	1290	2570		106.5	1860	5970
26.2	1280	2590		108.2	2150	6630
27.8	1220	2540		109.8	2370	7070
29.4	1130	2520		111.5	2390	7490
31.1	1090	2350		113.1	2240	6920
32.7	1010	2300		114.7	2120	6430
34.4	1040	2180		116.4	2120	7070
36.0	1090	2140		118.0	2370	7150
37.6	1140	1880		119.7	2340	6590
39.3	1160	1870		121.3	2230	6460
40.9	1190	1940		122.9	2300	6560
42.6	1210	2080		124.6	1960	6390
44.2	1340	2310		126.2	1840	6120
45.8	1560	2730		127.9	1590	5970
47.5	2060	3420		129.5	1500	5920
49.1	2120	3810		131.1	1530	6120
50.8	2110	3660		132.8	1510	5810
52.4	2080	3680		134.4	1560	6120
54.0	2010	3520		136.1	1590	6000
55.7	1970	3400		137.7	1540	5920
57.3	2120	3450		139.3	1620	5940
59.0	2090	3520		141.0	1710	6000
60.6	2000	3660		142.6	1610	5970
62.2	2020	3790		144.3	1580	6030
63.9	2030	4150		145.9	1540	5920
65.5	1950	4220		147.6	1610	5860
67.2	2150	4800		149.2	1660	5860
68.8	2260	5020		150.8	1770	6120
70.5	2620	5230		152.5	2000	6120
72.1	2570	4830		154.1	2050	6180
73.7	2530	4980		155.8	1980	6240
75.7	2290	4430				
77.0	2100	3900				
78.7	1940	3640				
80.3	1780	3310				
81.9	1620	3200				
83.6	1610	3220				
■ 0E 0	1600	2/1//	-			

Table A-3. Boring S0012R, S - R1 quality assurance analysis P- and S<sub>H</sub>-wave data

3290

1630

1660

85.2

86.9

# **CALIFORNIA HIGH SPEED RAIL BORING S0018R**Source to Receiver and Receiver to Receiver Analysis

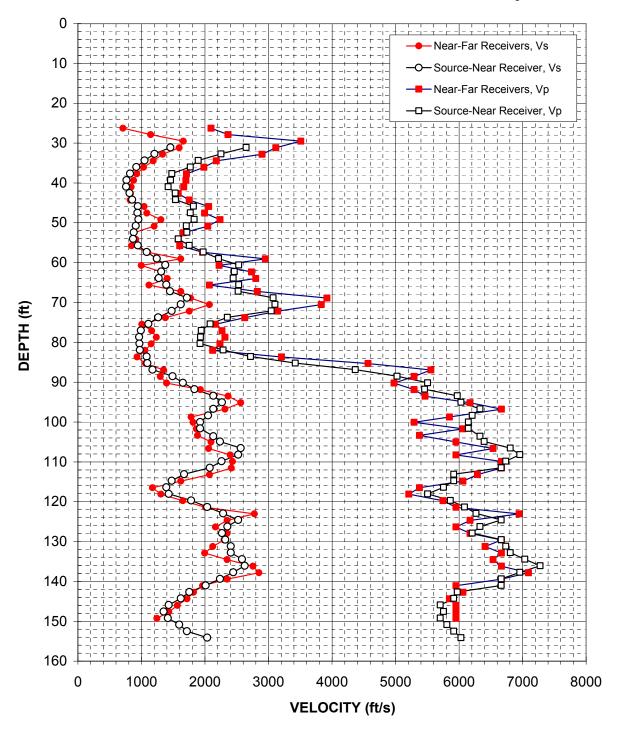


Figure A-4. Boring S0018R, R1 - R2 high resolution analysis and S - R1 quality assurance analysis P- and  $S_H$ -wave data

Depth (feet)         V <sub>s</sub> (feet/sec)         V <sub>p</sub> (feet/sec)           31.1         1460         2650           32.7         1210         2250           34.4         1050         1900           36.0         920         1770           37.6         820         1480           39.3         760         1460           40.9         760         1420           42.6         810         1530           44.2         860         1540           45.8         940         1820           47.5         940         1770           49.1         950         1830           50.8         910         1710           52.4         880         1720           54.0         870         1580           55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520 <th></th> <th>1</th> <th></th>		1	
31.1         1460         2650           32.7         1210         2250           34.4         1050         1900           36.0         920         1770           37.6         820         1480           39.3         760         1460           40.9         760         1420           42.6         810         1530           44.2         860         1540           45.8         940         1820           47.5         940         1770           49.1         950         1830           50.8         910         1710           52.4         880         1720           54.0         870         1580           55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3100	Depth	V <sub>s</sub>	V <sub>p</sub>
32.7         1210         2250           34.4         1050         1900           36.0         920         1770           37.6         820         1480           39.3         760         1460           40.9         760         1420           42.6         810         1530           44.2         860         1540           45.8         940         1820           47.5         940         1770           49.1         950         1830           50.8         910         1710           52.4         880         1720           54.0         870         1580           55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100			
34.4         1050         1900           36.0         920         1770           37.6         820         1480           39.3         760         1460           40.9         760         1420           42.6         810         1530           44.2         860         1540           45.8         940         1820           47.5         940         1770           49.1         950         1830           50.8         910         1710           52.4         880         1720           54.0         870         1580           55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           75.4         1110         2080			
36.0         920         1770           37.6         820         1480           39.3         760         1460           40.9         760         1420           42.6         810         1530           44.2         860         1540           45.8         940         1820           47.5         940         1770           49.1         950         1830           50.8         910         1710           52.4         880         1720           54.0         870         1580           55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350			
37.6         820         1480           39.3         760         1460           40.9         760         1420           42.6         810         1530           44.2         860         1540           45.8         940         1820           47.5         940         1770           49.1         950         1830           50.8         910         1710           52.4         880         1720           54.0         870         1580           55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080			
39.3         760         1460           40.9         760         1420           42.6         810         1530           44.2         860         1540           45.8         940         1820           47.5         940         1770           49.1         950         1830           50.8         910         1710           52.4         880         1720           54.0         870         1580           55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940			
40.9         760         1420           42.6         810         1530           44.2         860         1540           45.8         940         1820           47.5         940         1770           49.1         950         1830           50.8         910         1710           52.4         880         1720           54.0         870         1580           55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930			
42.6         810         1530           44.2         860         1540           45.8         940         1820           47.5         940         1770           49.1         950         1830           50.8         910         1710           52.4         880         1720           54.0         870         1580           55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920			
44.2         860         1540           45.8         940         1820           47.5         940         1770           49.1         950         1830           50.8         910         1710           52.4         880         1720           54.0         870         1580           55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290			
45.8         940         1820           47.5         940         1770           49.1         950         1830           50.8         910         1710           52.4         880         1720           54.0         870         1580           55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720			
47.5         940         1770           49.1         950         1830           50.8         910         1710           52.4         880         1720           54.0         870         1580           55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420			
49.1         950         1830           50.8         910         1710           52.4         880         1720           54.0         870         1580           55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370			
50.8         910         1710           52.4         880         1720           54.0         870         1580           55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020			
52.4         880         1720           54.0         870         1580           55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500			
54.0         870         1580           55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500           91.8         1830         5460			
55.7         940         1750           57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500           91.8         1830         5460			
57.3         1080         1970           59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500           91.8         1830         5460			
59.0         1240         2210           60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500           91.8         1830         5460		940	
60.6         1380         2530           62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500           91.8         1830         5460			
62.2         1310         2460           63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500           91.8         1830         5460	59.0		
63.9         1270         2440           65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500           91.8         1830         5460	60.6		2530
65.5         1390         2530           67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500           91.8         1830         5460	62.2	1310	2460
67.2         1450         2520           68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500           91.8         1830         5460	63.9	1270	2440
68.8         1720         3070           70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500           91.8         1830         5460	65.5	1390	2530
70.5         1620         3100           72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500           91.8         1830         5460	67.2	1450	2520
72.1         1480         3040           73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500           91.8         1830         5460	68.8	1720	3070
73.7         1260         2350           75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500           91.8         1830         5460	70.5	1620	3100
75.4         1110         2080           77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500           91.8         1830         5460	72.1	1480	3040
77.0         990         1940           78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500           91.8         1830         5460	73.7	1260	2350
78.7         960         1930           80.3         970         1920           81.9         980         2290           83.6         1080         2720           85.2         1090         3420           86.9         1170         4370           88.5         1490         5020           90.1         1650         5500           91.8         1830         5460	75.4	1110	2080
80.3     970     1920       81.9     980     2290       83.6     1080     2720       85.2     1090     3420       86.9     1170     4370       88.5     1490     5020       90.1     1650     5500       91.8     1830     5460	77.0	990	1940
81.9     980     2290       83.6     1080     2720       85.2     1090     3420       86.9     1170     4370       88.5     1490     5020       90.1     1650     5500       91.8     1830     5460	78.7	960	1930
83.6     1080     2720       85.2     1090     3420       86.9     1170     4370       88.5     1490     5020       90.1     1650     5500       91.8     1830     5460	80.3	970	1920
85.2     1090     3420       86.9     1170     4370       88.5     1490     5020       90.1     1650     5500       91.8     1830     5460	81.9	980	2290
86.9     1170     4370       88.5     1490     5020       90.1     1650     5500       91.8     1830     5460	83.6	1080	2720
86.9     1170     4370       88.5     1490     5020       90.1     1650     5500       91.8     1830     5460	85.2	1090	3420
88.5     1490     5020       90.1     1650     5500       91.8     1830     5460			
90.1 1650 5500 91.8 1830 5460			
91.8 1830 5460	90.1	1650	
93.4 2130 5970			5460
	93.4	2130	5970
95.1 2270 6030			
96.7 2130 6330			
98.3 2050 6210			
100.0 1920 6150			
101.6 1920 6150	101.6	1920	6150
103.6 2130 6330			
104.9 2240 6390			
106.5 2560 6810			
108.2 2520 6960			
109.8 2260 6730			
111.5 2080 6660			

Depth	V <sub>s</sub>	V <sub>p</sub>
(feet)	(feet/sec)	(feet/sec)
113.1	1670	5920
114.7	1480	5920
116.4	1390	5750
118.0	1430	5500
119.7	1780	5860
121.3	2040	6090
122.9	2290	6270
124.6	2520	6660
126.2	2350	6330
127.9	2270	6210
129.5	2320	6660
131.1	2410	6730
132.8	2410	6810
134.4	2580	7030
136.1	2630	7280
137.7	2440	6960
139.3	2240	6660
141.0	2010	6660
142.6	1750	5970
144.3	1620	5920
145.9	1430	5700
147.6	1350	5750
149.2	1420	5700
150.8	1590	5810
152.5	1720	5920
154.1	2040	6030

Table A-4. Boring S0018R, S - R1 quality assurance analysis P- and S<sub>H</sub>-wave data

# APPENDIX B BORING GEOPHYSICAL LOGGING SYSTEMS - NIST TRACEABLE CALIBRATION RECORDS



MICRO PRECISION CALIBRATION, INC. 12686 HOOVER STREET GARDEN GROVE, CA, 92841 (714) 901-5659

### **Certificate of Calibration**

Date: 8/8/2011 Certificate #: 1462196 Lab # 935.11

**Customer:** 

**GEOVISION** 

1124 OLYMPIC DRIVE Purchase Order: BCHMPC2001001

CORONA, CA, 92881 Work Order: N/A

MPC Control #: BG9698 Serial Number: 15014 Asset ID: Department: N/A 15014

Performed By: Gage Type: **LOGGER** TYLER MCKEEN Received Condition: Manufacturer: OYO IN TOLERANCE Returned Condition: IN TOLERANCE Model Number: 03331-0000 July 22, 2011 Cal Date: Size: N/A Cal. Interval: 12 MONTHS 70 °F / 35 % Temp./RH:

Cal. Due Date: July 22, 2012

### Found conditions meet or exceed manufacturer specifications.

#### \*Calibration Notes:

This certificate superceeds 1443814.

See attached data sheet for calculations. Calibrated IAW customer supplied calibration data form Rev 2.0

### **Test Points**

Description	Standard	Tolerance -	Tolerance +	As Found	As Left	UOM	Result
Test Frequency	50.000	49.500	50.500	50.000	50.000	Hz	Pass
Test Frequency	100.000	99.000	101.000	100.000	100.000	Hz	Pass
Test Frequency	200.000	198.000	202.000	200.000	200.000	Hz	Pass
Test Frequency	500.000	495.000	505.000	500.000	500.000	Hz	Pass
Test Frequency	1000.000	990.000	1010.000	1000.000	1000.000	Hz	Pass
Test Frequency	2000.000	1980.000	2020.000	2000.000	2000.000	Hz	Pass

### **Standards Used To Calibrate Equipment**

I.D.	Description	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
AM4000	WAVEFORM GENERATOR	33250A	MY40000703	AGILENT	8/17/2011	1063979
CC8501	GPS TIME & FREQUENCY RECEIVER	58503A	3710A08295	HEWLETT PACKARD	1/31/2013	1269299

Calibrating Technician:

QC Approval:

TYLER MCKEEN

Unless Otherwise Noted, Uncertainty Estimated at >= 4 to 1. Uncertainties have been estimated at a 95 percent confidence level (k=2). Services rendered comply with ISO 17025:2005, ISO 9001:2008, ANSI/NCSL Z540-3, MPC Quality Manual, MPC CSD and with customer purchase order instructions.

Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. The information on this report, pertains only to the instrument identified.

All standards are traceable to the National Institute of Standards and Technology (NIST). Services rendered include proper manufacturer's service instructions and are warranted for no less than thirty (30) days This report may not be reproduced in part or in whole without the prior written approval of the issuing MPC lab

> (CERT, Rev 1) Page 1 of 2





MICRO PRECISION CALIBRATION, INC. 12686 HOOVER STREET GARDEN GROVE, CA, 92841 (714) 901-5659

### **Certificate of Calibration**

Date: 8/8/2011 T1100

Lab # 935.11 COUNTER

3546A09912

HEWLETT PACKARD

1/27/2012

Certificate #: 1462196

1233372

**Procedures Used In This Event:** 

**Procedure Name** CALIBRATION GENERAL Description

53131A

GENERAL CALIBRATION INSTRUCTION

Calibrating Technician:

TYLER MCKEEN

QC Approval:

Unless Otherwise Noted, Uncertainty Estimated at >= 4 to 1. Uncertainties have been estimated at a 95 percent confidence level (k=2). Services rendered comply with ISO 17025:2005, ISO 9001:2008, ANSI/NCSL Z540-3, MPC Quality Manual, MPC CSD and with customer purchase order instructions

Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. The information on this report, pertains only to the instrument identified.

All standards are traceable to the National Institute of Standards and Technology (NIST). Services rendered include proper manufacturer's service instructions and are warranted for no less than thirty (30) days. This report may not be reproduced in part or in whole without the prior written approval of the issuing MPC lab.

Page 2 of 2

(CERT, Rev 1)

BG 9698



### SUSPENSION PS SEISMIC LOGGER/RECORDER CALIBRATION DATA FORM

INSTRUMENT DATA System mfg.: Serial no.: By:	OYO 15014 Tyler McKeen		Model no.: Calibration date: Due date:	3331 7/22/2011 7/22/2012
Counter mfg.: Serial no.: By:	Hewlett Packard 3546A09912 Micro Precision Calibration		Model no.: Calibration date: Due date:	53131A 1/27/2011 1/27/2012
Signal generator mfg.: Serial no.: By:	Hewlett Packard MY40000703 Micro Precision Calibration		Model no.: Calibration date: Due date:	33250A 8/17/2010 8/17/2011
Filter Range:			HCF: 20kHz le period in table below 10:00	W
PROCEDURE: Set sine wave frequency Note actual frequency on Set sample period and re	data form.			0.25 volt peak

.sps file. Calculate average frequency for each channel pair and note on data form. Average frequency must be within +/- 1% of actual frequency at all data points.

Pick duration of 9 cycles using PSLOG.EXE program, note duration on data form, and save as

	Target	Actual	Sample	File	Time for	Average	Time for	Average	Time for	Average
	Frequency	Frequency	Period	Name	9 cycles	Frequency	9 cycles	Frequency	9 cycles	Frequency
	(Hz)	(Hz)	(microS)		Hn (msec)	Hn (Hz)	Hr (msec)	Hr (Hz)	V (msec)	V (Hz)
	50.00	50.000	200	401	180.0	50.00	180.0	50.00	180.0	50.00
	100.0	100.00	100	402	90.00	100.0	90.00	100.0	90.00	100.0
	200.0	200.00	50	403	45.00	200.0	44.95	200.2	45.00	200.0
Ì	500.0	500.00	20	404	17.98	500.6	18.00	500.0	18.00	500.0
	1000	1000.0	10	405	9.000	1000	9.000	1000	9.000	1000
- 1	2000	2000.0	5	406	4 500	2000	4 505	1998	4.500	2000

Calibrated by:	Tyler McKeen	7/22/2011	Alm.	
	Name	Date	Signature	
Witnessed by:	Robert Steller	7/22/2011	2 Sc.	
	Name	Date	Signature	
Suspen	sion PS Seismic Recorder/Logge	er Calibration Data Form	Rev 2.0 July 21, 2008	

H